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ABSTRACT

This case study applies principles derived from the Center for Regenerative Studies (CRS) to a community college in North Carolina. CRS, on the campus of California State Polytechnic Institute (California), is dedicated to the education, demonstration, and research of degenerative systems in the areas of shelter, food production, energy, water and waste treatment. Regenerative systems are self-renewing systems in which the energy required to maintain them is continually replaced through their own functioning. This thesis contains five chapters covering the following: (1) different applications of regenerative strategies and values; (2) a discussion and evaluation of CRS; (3) a proposal on how regenerative studies can be incorporated into the continuing education and curriculum of a community college; (4) a specific case study of Central Carolina Community College's (North Carolina) sustainable farming program; and (5) conclusions. The paper concludes that the elements--modular scale, decentralization, community interactions and participatory formats--are common in both regenerative systems and community colleges. Each college maintains a balance of integration with the overall system, yet each is differentiated to reflect the concerns of its own community. They can be described as being of a small, modular scale in a decentralized system. Community interaction is present in regards to how community colleges provide continuing education and community-based programming. (Contains 88 references.) (AF)

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REGENERATIVE STUDIES

COLLEGE COMMUNITY and COMMUNITY COLLEGE

ED 438 856

Master of Landscape Architecture

Department of Landscape Architecture
N C State University

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December 11, 1998

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ABSTRACT

Regenerative systems are self-renewing systems, in which the energy required to maintain them is continually replaced through their own functioning. The Center for Regenerative Studies, (CRS), is devoted to the education, demonstration, and research of regenerative systems, in the areas of shelter, food production, energy, water and waste treatment. It is located in Pomona, California, on the campus of California State Polytechnic Institute. This paper is a single case study of CRS. It also includes an attempt to apply the lessons learned there to a different context, with the intention of expanding the reach of regenerative studies. The first part of this paper examines different applications of regenerative strategies and values, and their relative importance within a historical and educational context. The second part discusses and evaluates CRS, and suggests a regenerative value system. The third part proposes how regenerative studies could be incorporated in the continuing education curriculum of a community college. The conclusion demonstrates the relationship between a regenerative value system and the mission of the community college system, and the potential role that regenerative studies can play in making small communities more sustainable.

key words: center for regenerative studies, environmental education, community college, sustainability, regenerative studies

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DEDICATION and ACKNOWLEDGMENTS

This project is dedicated to the memory of two men named John, without whom it would never have been possible; John Woltz, my father, and John Lyle, father of the Center for Regenerative Studies, (CRS).

My efforts to describe and evaluate CRS were greatly facilitated by living and studying at CRS during the fall quarter of 1997. I am deeply indebted to the many faculty, staff, administrators (either formerly or currently involved there), and resident population, who shared their time and insights with me.

Thanks are also due to Karen Allen, provost of Central Carolina Community College, (CCCC), Pittsboro, NC, and the instructors and students of the Sustainable Farming Program, (SFP), at CCCC, Pittsboro.

I would also like to thank the members of my committee for their continued encouragement and support over the course of my project. Shishir Raval helped me find the theoretical framework to shape my project. Art Rice has grounded me in the reality needed to structure my project. Dean Malecha has been a marvelous bridge between California and North Carolina, and has provided helpful historical information regarding the beginnings of the Center, that he shepherded during his tenure at Cal Poly. Will Hooker has helped me bridge the gaps of my own consciousness, and has been a wonderful guide along the path.

Finally, thanks are due to the many others who have provided both moral and technical support along the way. I could never have done it without you.

Preface: What is Sustainable Development?

"Sustainable development is something of a paradox. The phrase implies that something must change but that something must also remain constant" (Holling, 1995, p. 24).

However, when considered within the context of a world that is evolving, it would follow that any attempts to "sustainably" coordinate our activities with existing natural processes would need to retain high levels of both diversity and flexibility. Or, as Dr. Norman Christianson, Dean of the Nicholas School of the Environment at Duke University, said during a lecture on sustainability, "the only normal thing is change," therefore, "sustainability is a journey, not a destination" (Christianson, 1998).

This concept of sustainable development first received wide, public attention from the Brundtland Commission document, *Our Common Future,* published in 1987. The Brundtland Commission, more formally known as The World Commission on Environment and Development (WCED), was created by the United Nations General Assembly in 1983. Its task was to study and report on the increasingly apparent environmental crisis (Milbrath, 1989). The report emphasized the important role of poverty in environmental depredation, particularly, in the lesser developed countries, and emphasized economic growth and sustainable development as the means of addressing it. It defined development to be sustainable if it "meets the needs of the present *without* compromising the ability of future generations to meet their own needs" (Orr, 1992, p. 23). Many continue to adhere to this definition. However, more recent thoughts have taken issue with the implications this definition has for the status quo, perceiving it to be more focused on technological sustainability, in which increased efficiencies will satisfy the requirements, without any real impingement on business as usual. Another group of advocates supports a more ecologically based view, that raises serious questions about contemporary lifestyles, and their profligate consumption and disposal of resources. I shall only be able to acknowledge that there are a myriad of permutations between and beyond each of these views, not to mention the wide array of dissenting ones.

My own tendency is to agree with those who see sustainability as ecologically based and beyond. It is much more than simply a crisis of overshooting the physical limits imposed by a planet with finite resources. There are also social and cultural sides to this situation. A sustainable world must be socially fulfilling (Meadows, 1993). It must provide a quality of life that will somehow derail the dominant view of contemporary society that equates success with purchasing power, and values quantity over quality. The

individual must become conscious of the connections between everyday decisions and the world to which each of us is inextricably linked, in order for sustainability to become a tangible and compelling reality.

Lester Brown, and other members of the Worldwatch Institute, have played a significant role in recording the progress of the world on its path towards sustainability through the *State of the World* series. In 1997, they identified the three most significant impediments on this road to be:

- human related climate change,
- reduction in biodiversity,
- growth of human population and consumption

(Brown, 1997)

Rather than approach these issues separately, however, it is crucial to appreciate that they are directly related to one another. In other words, they must be seen as parts of the same system, where any changes are magnified by the myriad of feedback loops - both positive and negative - that bind them together. One of the more important underlying issues of great significance to all three areas is social equity. In a world where 20% of the population consume 80% of the wealth, it is difficult to overstate its importance. For example, the 2.6 million people added to the US population in one year will *exceed* the pressures placed on the world's natural resources by the 17 million people added to India's population over the same period (Brown, 1997). The privileged few, who compose the overconsumptive 20%, must learn to lead by example. We must consume less, support efforts to stabilize the population among those less privileged, and allow for a more equitable distribution of the world's resources.

"Environmental movements cannot prevail until they convince people that clean air and water, solar power, recycling, and reforestation are best solutions (as they are) for human needs at human scales - and not for impossible distant planetary futures (Gould, 1994, p. 168).

In his book, *Regenerative Design for Sustainable Development*, John Lyle contends that sustainability can be achieved by replacing the conventional systems we currently use with regenerative ones. He describes regenerative systems as supply systems for materials and energy that renew themselves through the process of their own operation (Lyle, 1994). This paper will explore regenerative systems and strategies, and the various ways in which they may be applied towards sustainable ends.

CHAPTER 1: INTRODUCTION

"The ecosystem and its modes of order provide a conceptual model of the world that serves well as a basis for regenerative design."

"Regenerative Design means replacing the present linear system of throughput flows with cyclical flows at sources, consumption centers and sinks."

"Regeneration has to do with rebirth of life itself, thus with hope for the future."

(Lyle, 1994, p. 10-23)

WASTE EQUALS FOOD

I had two bowls of strawberries, but as I was very hungry I ate both, and am now left with two bowls of stems. The first I shall place in the garbage can, and the second will go to the worms, literally.

This is a simplified illustration of the difference between conventional, throughput flows and regenerative processes. As a society, we have become inured to the linear activity of consumption and disposal, as well as to the abounding calculations that document the depth and breadth of our wastefulness. I shall pay $2.60 this month for the privilege of allowing my strawberry stems to join the municipal waste stream, to its final destination at Raleigh's municipal landfill.

The average municipality spends 2-3% of its annual budget on waste disposal, which is about the same as the expenditures for the police and fire departments, electric power and water supply (Lynch, 1990). According to one expert on industrial metabolism, the waste stream begins long before it even reaches the manufacturing stage. About 94% of extracted materials are transformed into waste before *any* products are made (Baird, 1997). Other factors to consider are the hidden costs embodied in the purchase of these goods. Examples of this would include subsidies paid for the extraction of raw materials (roads in national forests), pre-sale warehousing and post-sale space requirements, and, finally, the costs to future generations in the various forms of pollution and non-renewable resource depletion (Hudson, 1997).

Yet another insidious cost of this one-way trip is the indefinite period that these materials will languish in the hermetically sealed landfill. (One can only hope that the seal will hold the toxic materials.) As a result, the 25% paper, 20% compostable materials, including strawberry stems, 10% metal,

and the 5% glass, must be replaced by additional natural resources (Hudson, 1997). For just one example, the energy cost is 95% *less* to remanufacture the recycled aluminum can than to manufacture it from scratch.

Fortunately, the strawberries, mentioned earlier, were grown without pesticides or synthetic fertilizers. Otherwise, there might have been a concern for connections to illnesses in field workers that administer the chemicals, and harvest the berries. According to 1993 EPA data, strawberries had the highest percentage of pesticide residues of any of the assorted fruits and vegetables tested (*The 1994 Information Please Environmental Almanac*, 1994). The plight of strawberry pickers has been the focus of recent United Farm Workers Union campaigns. There also might have been a risk of suffering from *cyclospora cayetanesis* intestinal infections that received a lot of media attention in 1996 (Goeman, 1996).

Who pays for the 94% of waste that is generated by processing and extracting materials, before the manufacturing process even begins? What will it take for us to connect the strawberries we ate for breakfast with the poisoning of the soil with methyl bromide, the trip to the mall with the death of downtown, or the air conditioner with the floods in California? We are already surrounded, and becoming increasingly overwhelmed by the consequences of the decisions we each make every day. It's all about *connections*. To quote Hunter Lovins, from the recent Bioneers Conference, "the cause of your problem is likely to be your prior solution if you don't understand interconnections" (Lovins, 1997).

FIVE ECOLOGICAL PROCESSES

Meanwhile, back at the worm bin. . . The worm bin illustrates a regenerative path, which is a circle, or cycle. It may be considered in terms of five basic ecological processes of ecosystem functioning: **distribution, filtration, assimilation, conversion, and storage** (Lyle, 1994, p. 26). Distribution is the vehicle that conveys energy and nutrients to the community living in the worm bin. Scraps, like strawberry stems, are distributed to them, or water is added, which later becomes evenly distributed throughout the bin. Filtration occurs when too much liquid is present in the bin, and it filters through the contents, and is stored in the tray below to create a nutrient-rich tea for use on plants. Next, the worms and other creatures in the bin, assimilate and convert the strawberry stems to worm castings, a humus-like material that stores the nutrients in a readily available form that plants can use as needed (Appelhof, 1997). When these are placed around the young strawberry plants the cycle is completed.

The five basic ecological processes described above form the foundation for the regenerative strategies that will be discussed at greater length in the

following chapter of this paper. Comparisons will be made between the strategies and the principles that form the basis of the study of Permaculture, in an effort to establish some common ground between the two. The third chapter, will focus on the development of the Center for Regenerative Studies (CRS), located on the campus of California State Polytechnic Institute, in Pomona, California. This will be followed by an evaluation in the form of lessons to be learned from CRS. In chapter four, these lessons will ultimately be applied to a revised model, located on the campus of Central Carolina Community College (CCCC), in Pittsboro, North Carolina.

SCOPE OF THIS PROJECT

This is a single case study. This places certain limitations on this project. First, I have not explored other alternative, environmental initiatives to compare and contrast their experiences with CRS, but that would be an extremely fruitful area for future research. Second, and more importantly, this project is not intended to be a critical review of CRS, or an attempt to offer solutions to any problems that may exist there. It is merely an effort to extract useful information that may be of service to others attempting a similar type of endeavor.

RESEARCH STATEMENT

The initial question of this paper will focus on the essence of the "fit" between the theory of regenerative design, and the scale and location of its application at CRS. Secondarily, the gap separating the theory from the application will be explored, by identifying the value system that informs each of them. Finally, an alternative application of a revised model will be proposed. Research on this topic has led me to believe that the successful functioning of regenerative systems is contingent upon a thorough understanding of the regenerative value system that distinguishes them. This knowledge is also relevant in determining their appropriate application.

CHAPTER 2: REGENERATIVE STRATEGIES AND VALUES

"A Regenerative system provides for continuous replacement, through its own functional processes, for the energy and materials used in its operation" (Lyle, 1994, p.10).

DISCUSSION OF REGENERATIVE STRATEGIES

This chapter is intended to provide a basic understanding of the regenerative strategies that serve as guidelines for the development of regenerative systems. The strategies will be further clarified through comparison to the principles of Permaculture, which are also patterned after natural systems. The appropriate implementation of regenerative systems is informed by a much broader, regenerative value system that will be the topic of subsequent discussion. The relevance of regenerative studies to society at large will then be explored within the historical context of a "green" history of the world. Finally, the potential benefits that they may offer for the enrichment of environmental education will conclude this chapter. But first, why Permaculture?

PERMACULTURE

Not surprisingly, there is a great deal of overlap among the various sets of ecological principles emerging from the environmental movement at large. The principles of Permaculture were chosen due to personal experience with Permaculture, both in Australia and the United States, and the relevance of this choice for the later application on the campus of CCCC. Most of the management team there already has a working understanding of Permaculture, so this is intended as a bridging mechanism to illustrate the similarities between it, and regenerative studies.

The development of Permaculture began in Australia in the mid 70's, through the combined efforts of Bill Mollison and David Holmgren. It has since expanded to global proportions with a significant presence on most continents. The term Permaculture is derived from permanent agriculture, or culture, and it focuses on the design of human environments that are self-sustaining. At its essence, Permaculture is a design system that bases the placement of elements in the landscape on the creation of relationships that will be economically viable and ecologically sound. It too derives its principles from natural systems, thus sharing much common ground with regenerative systems.

One of the more exciting aspects of Permaculture for me is its modest beginning. It is a grass-roots movement, born in "arguably the most fragile, inhabited landmass on the Earth" (Smith, 1990, p. 163). Though the size of the continental US, Australia is considered by many to already be exceeding its carrying capacity. The population is 18 million people. (Of course, in addition, there are untold thousands of sheep and cattle that have seriously impacted the ecological balance of the continent.) Permaculture began as an attempt to rethink the increasingly strained relationships between the individual, the community and the Earth. Because of its extensive land mass, and relatively small population base, much of the infrastructure that we take for granted here in the US, is simply not feasible there. To a certain extent, this has encouraged the pioneering ingenuity that once described America, to continue there in a much purer form. Permaculture has molded this do-it-yourself mentality into small patterns of self-sufficiency that are remarkably sustainable. This endeavor to transform limits to growth into opportunities for the development of quality relationships, holds many lessons for regenerative thinkers.

BACKGROUND OF THE TERM REGENERATIVE

The five basic ecological processes of ecosystem functioning (distribution, filtration, assimilation, conversion and storage), that sustain life in natural systems are inherently regenerative through their combined ability to cycle nutrients and materials. The term, regenerative, has had a broad range of applications, but Robert Rodale, of the Rodale Institute, was the first person to associate this word with the *use* of the land. Although traditional farmers have long recognized the organic processes of self-renewal that unfold in soil that has not been treated with agricultural chemicals, it was Rodale who first promoted this as being a "regenerative" process. John Lyle has expanded this idea even farther by applying the five ecological processes to the functioning of human systems. These processes, consequently, become the basis for the self-renewing, or regenerative systems that can sustain the fundamental needs of daily life: food, shelter, energy, water and waste treatment (Lyle, 1994).

REGENERATIVE STRATEGIES

Much like the farmer tests the soil to know the relative availability of nutrients that will nourish his crops, it is important to understand the tools with which John Lyle's vision of regenerative systems was constructed. In order to develop these systems, Lyle identified a set of regenerative strategies to serve as guiding principles. They may also act as a barometer with which to monitor the degree to which each strategy has been respected in the actual implementation of the design.

Following is a list of the individual strategies and the corresponding Permaculture strategy.

Regenerative Strategies	***Permaculture Principles***
1. Nature as both model & context	*Optimizing management of biological resources,*
2. Using information to replace power	*Efficient energy planning,*
3. Matching technology to need	*Small-scale intensive systems,*
4. Prioritizing for sustainability	*The problem is the solution,*
5. Managing storage as the key to sustainability	*Relative location/Energy Cycling,*
6. Letting nature do the work	*Management of biological resources,*
7. Seeking common solutions to disparate problems	*Multiple functions,*
8. Aggregating, not isolating	*Stack and pack,*
9. Providing multiple pathways	*Redundancy,*
10. Seeking optimal levels for multiple functions	*Multiple functions,*
11. Shaping form to manifest process	*Energy cycling,*
12. Shaping form to guide flow	*Edge effects/Patterns*

EXAMPLES OF REGENERATIVE STRATEGIES

A brief explanation of each regenerative strategy has been written. The strategies are then illustrated with examples of how they could be applied to issues related to policy (what? and why?), planning (where? and why?), and design (how? and why?), in an effort to relate these strategies to a variety of scales, ranging from national policies to vegetable garden design. This demonstrates how ecological thinking can impact and inform decision making in a broad range of areas. It also helps to make the connection between natural systems and human systems more explicit, by emphasizing the connection between where we live and how we live.

Nature as both Model and Context

When taken in the broadest sense, this strategy acknowledges that the natural world is both the source and the sink of all human endeavors. Though occurring at a vast range of scales, natural processes are inherently regenerative. By patterning our own systems after natural ones, we can more closely achieve systems that both maximize resources and minimize sinks.

Policy: The policy implications of this strategy are significant. Recognizing the existence of natural systems, or natural capital, on a site, leads to a greater sense of its inherent value. This value must then be weighed against the value of any interference, or activity on the site. The protection of wetlands, due to the significant role they play in both the filtration and purification of water, would be a prime example of this.

Planning: By protecting, or working with existing natural systems rather than paving over them, both short and long term energy costs can often be reduced. The zoning of agricultural lands and open space, or green belts, adjacent to urban areas, would exemplify this.

Design: By observing natural plant communities, designers can identify guild relationships that can be emulated in the selection and placement of plants in order to optimize the usage of available energy.

Using Information to Replace Power

According to Amory Lovins, author of *Soft Energy Paths* and well-known energy expert, the conventional light bulb is no more than a space heater that gives off a little light. It is only 4% efficient. Only 2% of a car's energy is used to actually move and stop its wheels. He claims that our industrial infrastructure is only 6% efficient, due to the waste entailed in getting products to the customer (Ausubel, 1997). He advocates allowing the end use to determine the quality of energy required for the task, whether it be heating a house or running a stove. Using high quality electricity to heat a drafty

house is the equivalent of using a nuclear powered chainsaw to cut butter (Vander Ryn, 1996). It is estimated that industrial efficiency could be increased by as much as 30 - 90% through better design (Ausubel, 1997).

Policy: Negawatt policies are used by power companies to encourage and reward consumers for using less power, rather than more. By reducing total capacity requirements, power companies can avoid the added expense of expanding, or worse, building new facilities.

Planning: Traditional farmers have been employing sophisticated crop rotation systems and composting distribution for years, with excellent results. Understanding the needs of the plants and supplying them with other plants, instead of petroleum-based fertilizers, is not only more efficient, but also much less expensive.

Design: One of the best examples of this would be a passive, solar house, where site-specific information can guide the designer to such an extent that no conventional power inputs are required.

Matching Technology to Need

The "least-cost" energy strategy would also be applicable here, but then, so would a clothesline. By matching technology to need, much smaller scale, higher efficiency systems are possible, that avert the need for extensive infrastructure.

Policy: Once again, enlightened policy decisions would be responsible for weighing the potential benefits for reduced infrastructural requirements.

Planning: The reduced need for extensive infrastructure could allow for greater planning flexibility. Wasteful sprawl could be replaced by a mosaic of dispersed units of high density, surrounded by open space and agricultural lands.

Design: In Permaculture design, the efficient use of animals can replace lots of gas-guzzling technology, whether it be draught horses for plowing, or simply a few pigs. There will still be fumes associated with the latter choices, but the compost is guaranteed to be a lot better. Yet another, perhaps less odiferous example is a windmill-driven water pump, used to provide water for livestock.

Prioritizing for Sustainability

This can be a consideration upon which to base purchasing decisions. When deciding between organic lettuce, grown in Mexico, and conventionally

grown, local lettuce, how does one decide? Is organic always better? Is it more sustainable?

Not necessarily so, when one considers the shipping and extensive costs of materials required in large-scale, organic production (which if they are growing in Mexico is more than likely the case), that replace conventional pesticides and synthetic fertilizers. Not to mention the costs of both water and fuel required for the irrigation of the crop. In addition, there are tremendous freight costs required to go from Mexico to the purchasing agent, then the distributor, and finally to your local supermarket. How far did the head of lettuce you see at the local farmer's market travel?

It simply is not that simple.

Policy: One of the clearest examples of the implementation of this type of strategy, is increased consideration of life-cycle analysis. This has been translated into policy in Germany, where manufacturers are required by law to take back both packaging and products. This includes items such as cars and computers.

Planning: Zoning is once again a critical factor in the protection of agricultural lands. In 1996 alone, Colorado lost 200,000 acres of agricultural land. That equals 300 square miles! (Goering, 1998) Land trusts are an increasingly effective strategy for protecting farmers against the rising tax and inheritance fees associated with highly valued land holdings.

Design: Life-cycle analysis becomes an essential consideration for any purchase. Have you ever tried pushing on a string? By insisting whenever possible on recycled goods, this effectively increases demand for recycled raw materials. This pulls on the string instead of pushing it -- a lot easier (Hudson, 1997).

Managing Storage as a Key to Sustainability:

Efficient storage is an effective way to maximize resources, thus avoiding the need for replacement resources as inputs. Compost, for example, is another form of storage in which garden, yard and animal "wastes," can be transformed into humus. Humus is like a savings account for plants. It contains moisture and mineral nutrients that are readily available for plants on an as needed basis. This alleviates the need for expensive synthetic fertilizers and frequent irrigation.

Policy: Looked at in a different way, what effects would a *reduction* of storage space, have on sustainability? Let's use refrigerator space as an example. At first glance, using fewer of those ozone-gobbling CFC's would be a good thing,

but what else? Most "less developed" countries still lack even the bare minimum of cold storage, and even in the "developed" countries, bountiful cold storage remains a relatively recent phenomenon. Parts of western Europe still offer examples of how this affects daily lifestyles. Less cold storage can translate into more frequent shopping, and though this does demand more time it also results in fresher food, more human interaction and community building, more street markets, added pressure for improved mass transit, and denser settlement patterns (Wilkinson, 1994).

Planning: The carryover from this idea into planning is significant. It is difficult to reconcile the needs for improved mass transit with the prevalent sprawling suburban pattern of development. Mixed-use zoning would be helpful for increased density, as would the ability for infill construction (such as constructing adjunct housing, or granny cottages, on existing sites). Greenways, bike trails or simply sidewalks, in some cases, would aid non-motorized transportation. Community, or allotment gardens, would offer opportunities for more produce to be grown in urban areas. Though the reduction in freight and traffic congestion may not be tremendously significant, the added respect for the skill and labor required to produce food would enhance the consumers' appreciation of both farmers and farmland.

Design: For viewing storage from a different perspective, as more of an insurance policy, the focus will shift to the conservation of a fundamental resource, water. In the 1950's, P.A. Yeomans, an Australian farmer, designed a system of water harvesting called keyline farming. He developed a series of check dams, connected by channels located along the keylines of hillsides (the point at which the hill changes from convex to concave). These dams stored rainwater, both for livestock and for irrigation purposes.

Letting Nature do the Work:

Those same powers of observation that develop by using nature as a model, become instrumental in creating systems patterned after natural ones. Observation yields many opportunities to work in concert with nature rather than temporary attempts to replace, or subdue natural processes, neither of which has much of a chance for success in the long run. This strategy may be applied at a broad range of scales, from a constructed wetland to replace a municipal sewage treatment plant to a deciduous, shade tree on the southern side of a house.

Policy: When faced with the significant costs of installing a conventional waste treatment facility, many smaller municipalities have opted for the road less traveled. Constructed wetlands are not only capable of meeting treatment requirements for a fraction of the cost of conventional methods, but they have a number of other benefits. Additional bonuses include excellent bird and wildlife habitat, and a wide range of outdoor recreational possibilities.

Planning: Once again, it is only through the combined efforts of policy and planning decisions that alternatives can provide effective solutions. The constructed wetland example presents certain limitations, with regard to scale issues, but this offers an illustration of the need to look at problems from multiple viewpoints, and to coordinate their solution at many different levels. In this instance the location and the designation of the land for this use would each be critical elements of its success.

Design: One of the more obvious applications of this strategy would be the passive solar heating structures. Paying close attention to sun angles permits daylighting and passive solar warming to enhance the aesthetics (in the classical sense of the term, by heightening the awareness of all of the senses) of the design of buildings, without adversely affecting the overall costs.

Seeking Common Solutions to Disparate Problems:

Incorporating elements that perform multiple functions not only maximizes resource and energy usage, but on a deeper level, plugs into the network of interconnections that exist in living systems. This becomes particularly apparent when designing complete systems that provide for a range of human needs. Synergy is truly the operative word.

Policy: The constructed wetland mentioned earlier offers an excellent example of solving many problems with a common solution. Yet another example would be the multiple roles of community gardens. Successful models exist from San Francisco (San Francisco League of Urban Gardeners - SLUG) to Durham (South Eastern Efforts Developing Sustainable Spaces - SEEDS). Not only do these gardens assist in the realm of community food security, but at a much deeper level they anchor the roots of community, and provide urbanites with opportunities to reconnect with the natural world.

Planning: The planner could be guided by this strategy within many realms. One of these is the area of transportation. Greenways, or linear parks, are an excellent method of providing alternative transportation opportunities, that also serve as recreational facilities. At the same time, they protect fragile ecosystems from development and offer significant economic benefits. Economic benefits range from increased property values on adjacent land holdings, to tourism opportunities, and reduced costs of flood mitigation through protection of riparian areas. Perhaps most important, however, is the preservation of natural areas and open space as complements to the increased density of urban areas (Flink, 1993).

Design: A lot of design is based on problem solving, and good design often distinguishes itself by providing an elegant solution to disparate problems. One of the many reasons this is important for spatial design is that it adds a

sense of coherency, or legibility to the design, by unifying the different parts. These different parts also have physical and material aspects, that when understood as manifestations of ecological processes, can be interconnected according to their interrelationships.

Aggregating, not isolating

This is another method that optimizes the synergy inherent in natural systems. It also explains why considering the provision of basic needs as an integrated, small-scale set of systems, provides a much more sustainable approach than the more typical, large-scale, separation and concentration of waste treatment in one place, energy generation in another, and food production in yet another.

Policy: One of the clearest examples of the advantages of adopting this strategy for decisions of policy making, would be in the area of zoning for areas of mixed-use. Reviving old traditions of housing opportunities for many *different* levels of wage earners, in downtown areas would have a range of benefits, from social to environmental. Critical to the success of this strategy is the issue of context, as will be discussed with regard to planning.

Planning: "New Urbanism" demonstrates the potential hazards of isolated aggregates. New Urbanism, born in the mid 1980's, was a planning initiative that attempted to revive traditional town planning. It emphasized the benefits of mixed-use, high density development that encouraged pedestrians and provided public civic and open space. Many of these concepts have already been discussed in this chapter. However, there *are* problems. Fundamentally, New Urbanism is not urban. Most of the examples built thus far are in suburban or exurban locations (Beatley and Manning, 1997). Nor do they have any connection to pre-existing places, because they are completely new. Therefore, rather than fixing a damaged site, they have started anew on *former* open space. As regards the social ecology of place, there is an unhealthy lack of biodiversity, and a disturbing degree of homogeneity.

Design: Regarding social ecology, it would behoove the designer to be aware of the variety of needs of different user groups. When these are clearly understood, areas of overlap begin to emerge. Many groups can be mutually beneficial, such as the mixing of elderly with young children, or even teaming up young children with an older aged child as mentor.

Providing Multiple Pathways:

The equivalent strategy in Permaculture is called redundancy. One of the more poignant, recent examples of its importance was the three week power failure in Auckland, New Zealand. This left thousands of people stranded in

the middle of summer with no refrigerators, air conditioners, elevators or lights. Costs are estimated to run into the hundreds of millions of dollars (Davis, 1998). Providing a variety of solutions for the same problem is the essence of good planning.

Policy: The simplest way to translate this into policy is to follow the old adage, "Don't put all of your eggs in one basket." By investing in a single megalo-infrastructure, not only does it increase the pressure on that one system to *always* work, but it also introduces an element of rigidity into decision making, intensifying recalcitrance towards better, perhaps more efficient alternatives. Amory Lovins calls this condition "lock-in." "The more there is of it, the more dominance it gets" (Warshall, "Whole Earth Review," p. 53).

Planning: Many cities are providing opportunities for using alternative power sources. One example of solar power, and one of wind power will be cited. The Sacramento Municipal Utility District (SMUD), in California, has installed photovoltaic, (PV), generators on the rooftops of hundreds of their customers' homes. Austin, Texas has purchased enough wind power from the Texas Wind-Power Project to supply the need of 4,000 homes (Beatley and Manning, 1997).

Design: The city of San Jose, California has developed a set of solar design guidelines to aid developers in taking advantage of solar orientation issues, and recommends additional solar features that can be incorporated in new developments, to reduce power needs (Beatley and Manning, 1997). Consequently, good design becomes yet another pathway towards sustainable levels of power demands

Seeking Optimum Levels for Multiple Functions:

The concept of multiple functioning has already been discussed as a method of maximizing resources and energy. The key to this strategy is the operational range within which various systems may operate without erring on either extreme, and, consequently, jeopardizing other links in the system (Lyle, 1994).

Policy: This strategy has relevance for the development of "industrial ecology." This is a philosophy that develops links between manufacturers, so that the wastes of one can become the inputs for another. Hardin Tibbs, one of the pioneers of this concept, takes this even farther to propose that businesses begin to adjust levels of inputs and outputs to correspond to the source and sink limits of their environments (Hawken, 1993). Establishing source and sink restrictions via policy measures could advance this type of creative solution to these problems.

Planning: Respect for the operational ranges of various systems means that planners must be particularly cognizant of scale issues. Small-scale, modular designs are predominantly more sustainable and productive than their contemporary counterparts. They also provide the opportunity to put the *public* back into *public* works by making them more accessible, appealing and secure.

Design: It is important to remember that regenerative design replaces many mechanical systems with *living* ones. This carries with it the added responsibility of using an earlier strategy, "Using information to replace power." Understanding the connections between components, as well as the range within which each system operates, is only a beginning. When working with living systems, observation and experience are the tools that are best suited to achieve optimum levels.

Shaping Form to Manifest Process:

"Genus loci," or spirit of place, describes the essential character of a place; its essence. This quality arises from the specific natural processes that give any site its own identity.

Policy: "As nature has receded from our daily lives, it has receded from our ethics" (Vander Ryn, 1996, p. 161). One of the most powerful opportunities for this strategy is to reincorporate natural processes into everyday life by making them visible in our designs.

Planning: In Permaculture design, frequency of use helps determine the spatial organization of activities. Space is divided into zones. Zone 1 would be for intense activity (herb and salad gardens for example), while Zone 4 or 5 would be forest or pasture, which require low or infrequent energy investments.

Design: Take the creek out of the pipe, the electricity out of the grid and let the sun shine in.

Shaping Form to Guide Flow:

The fractal geometry of a watershed is a superb example of how form can naturally shape flow. When flow is shaped by form, external inputs of energy can be greatly reduced.

Policy and Planning: One of the most striking examples may be found in New Zealand, where regional governance councils are now delineated according to watersheds (Beatley and Manning, 1997).

At a more local scale, one may look to Village Homes, a very special neighborhood in Davis, CA, designed by Michael and Judy Corbett, in the mid-70's. It is the embodiment of ecological design. It incorporates many of the strategies discussed thus far in this project, including: solar orientation of the houses, that are relatively small and clustered together to optimize green space, and favor pedestrians, open swales for storm drainage, and abundant edible landscaping. This is also an example where one "does well by doing good," as Ray Anderson, CEO of Interface, Inc. and co-chair of the President's Council on Sustainable Development, likes to say. The ecological results are matched by equally impressive economic ones. Property values exceed local levels, while energy consumption is as much as one half less, and occupancy turnover and crime rates are both low (Beatley and Manning, 1997).

Why aren't there more examples like this one? One of the primary reasons is regulations that prohibit many of these innovations. The Corbetts were almost forced to abandon their project many times, due to regulatory agencies (Lyle, 1994). It is here where informed individuals, acting at the local level, can make the biggest difference.

Design: Permaculture places great emphasis on the benefits of "edge effects," or the interface of two ecologies. Swamps and marsh ecosystems are some of the most biologically productive natural systems, producing as much annual biomass as a tropical rainforest (Ricklefs, 1993). Creating forms that provide more edges allows for much higher exchanges of energy.

A comparison of building types before and after the advent of air conditioning would provide a very poignant example of the *aesthetic* consequences of ignoring natural processes.

REGENERATIVE VALUE SYSTEM

John Lyle identified several characteristics of regenerative systems, including:

- a small, modular scale of operation,
- a participatory format,
- community interactions,
- a tendency towards decentralization (Lyle, 1994).

Many of these same issues were raised in both my interviews and my interactions at the Center. In the majority of cases, the consequences of ignoring them interfered with the overall success of the project.

I feel that these core concepts have the potential to become the *beginnings* of a regenerative value system that would be very helpful in guiding the larger dialogue towards a more serious consideration of the causes of our current

ecological distress. Knowledge of the treatment of waste, for example, is only part of the problem. Until we delve into the production and ultimately the reduction of waste we shall remain at the same level of thinking that created the problem in the first place. A regenerative value system would also be instrumental in the wider application of both regenerative systems and centers. Consequently, this discussion of values will be continued in the third chapter of this project, in conjunction with the evaluation and derived guidelines of the Center for Regenerative Studies. It is essential that a dialectical relationship be maintained between theory and practice, as well as the values and behaviors that inform them.

The next part of this chapter will attempt to establish the current relationship between humans and the biosphere within its historical context. Perhaps a clearer understanding of how we got here, will illuminate the means by which we can mend the rift that separates humans from the world in which we live, as manifested by the *way* in which we live. This will be accompanied by a discussion of the role that regenerative strategies and values may play in bridging this gap.

RELEVANCE OF REGENERATIVE STUDIES FOR SOCIETY

"The problem for all human societies has been to find a means of extracting from the environment their food, clothing, shelter and other goods in a way that does not render it incapable of supporting them. The challenge has been to anticipate or recognize at what point the environment is being badly degraded by the demands placed upon it and to find the political, economic and social means to respond accordingly" (Ponting, 1991, p. 407).

A BRIEF GREEN HISTORY OF THE WORLD

To date, the interaction between humans and their environment has not been a particularly benign one when viewed from an ecological perspective. In his book, *A Green History of the World*, Clive Ponting traces the historical relationship of man and his environment (Ponting, 1991). He describes the rise and subsequent demise of earlier civilizations due to their failure to live within the limits imposed upon them by external environmental factors. Ours is certainly not the first civilization to be faced with ecological collapse. We may, however, be distinguished (by whom I am not sure) as the one with the widest scope and greatest efficiency, in terms of the time it took us to push all of the biological systems beyond their natural limits. Perhaps it is our destiny to repeat history. However, I feel that it is our task and, more importantly, our moral responsibility as stewards for future generations, to avert the oncoming crisis.

It is only in the last 1% of our time on earth that we have extended our role beyond that of hunter gatherers. For the greater part of two million years our numbers remained in direct proportion to available resources, until increasing mobility allowed access to additional resources, and the concomitant increase in population. This increase in population pressures was a factor in the first great transition in human history -- the advent of agriculture, roughly 10,000 years ago. What ensued was a more settled, sedentary lifestyle, and the gradual development of human settlements. Diversification of tasks, acquisition of goods, and population growth soon followed, and the birth of the city was well on its way (Ponting, 1991).

This "urbanization" was largely due to the second great transition of human history, which has occurred over the last 200 years -- the use of fossil fuel energy sources, and the resulting growth of industrialization (Ponting, 1991). Wendell Berry describes this as the disruption of the equilibrium between life and machinery. He suggests that this happened because "people began to desire long-term stores of energy - that is, when they began to think of energy as volume, as well as force - and when machines ceased to enhance or elaborate skill, and began to replace it" (Berry, 1977, p. 82). In the United States, this increasing availability of fossil fuels saw the gradual transformation of a rural, agricultural based economy, to an urban, industrial

one. By the mid 1980's, urban areas had become home to nearly half of the world's population.

Agriculture has evolved into agribusiness in its efforts to keep pace with the demands of the ever expanding urban population. Urban dwellers have also become increasingly detached from the source of their food supply. "The urban environment serves to isolate us from an awareness of the natural and living processes that support life" (Hough, 1995, p. 15). There is little about the kitchen tap to suggest the watershed from which the water flowing through it originated. Packaged meat has no feathers or fur to betray its bestial source. The "drug dependent" lawns that carpet public parks are but abstractions of the pageantry of the open plains. (Hough, 1995) These are but a few examples of the alienation that has arisen between contemporary culture and its ecological context.

This ability to transcend natural limitations has significantly altered our view of the natural world. It is no longer seen as the source and context of our life on earth, but as the resource and means by which we satisfy not only our needs, but also our increasingly extensive range of wants. What beliefs may be said to justify treating irreplaceable fossil fuels as income, instead of as natural capital, or favoring mass production over production of the masses, or valuing means above ends, or short term profits over long term ideals? Has something been lost in the translation of our beliefs into our behavior? E. F. Schumacher says "that the sins of fathers in the nineteenth century have been visited on the third and fourth generations living in the second half of the twentieth century" (Schumacher, 1973, p. 95).

What began as complex, intellectual processes are now simply tools and methods with which we shape the world. We, in the "developed" countries, often referred to simply as "the North," have evolved into a society lacking the moral grounding to distinguish between needs and wants. Our understanding of needs has expanded beyond those elements considered vital for survival, such as food, shelter, clothing, and clean air and water, to encompass wants that are to a large extent shaped by individual choices, society and culture (Des Jardins, 1997). This expansion does not come without certain tradeoffs, because as our "needs" increase, so does our reliance on outside sources (namely science and technology) for their provision, accompanied by a loss of control, and an insidious fear that these needs will somehow not be satisfied. In essence, we have traded freedom and peace, for dependency and fear. E. F. Schumacher makes the following comment about this estrangement in his book, *Small is Beautiful*. "If Western civilization is in a state of permanent crisis, it is not far-fetched to suggest that there may be something wrong with its education (Schumacher, 1973, p. 84). The next section of this chapter will investigate this link more explicitly, in terms of regenerative studies and education.

APPLICATION FOR HIGHER EDUCATION

"The need to develop cultural traditions that allow the environment to regenerate correlates with the need to reverse the modern trend of expanding the scope of economically and technologically mediated relationships - which the various interpretations of liberalism continue to legitimate" (Bowers, 1997, p. 208).

Double bind for environmental education

There are countless advocates within the environmental movement, calling for a more complete understanding of the ecological ramifications of the consumer driven lifestyle so prevalent in western society. In her presidential address at the annual meeting of the American Association of the Advancement of Sciences, Jane Lubchenco described the three areas in which human enterprises are changing the environment. They "transform the land and sea - through land clearing, forestry, grazing, urbanization, mining, trawling, dredging, and so on; alter the major biogeochemical cycles - of carbon, nitrogen, water, synthetic chemicals, and so on; and add or remove species and genetically distinct populations - via habitat alteration or loss, hunting, fishing, and introductions and invasions of species" (Lubchenco, 1997, p. 491). Her talk focused on an appeal to the scientific community to develop a new social contract that recognized "the intimate connections between [ecological systems] and human health, the economy, social justice and national security" (Lubchenco, 1998, p. 491).

Almost 25 years ago, E. F. Schumacher examined the connection between the culture of the Scientific Revolution and education. It was his contention that for far too long the emphasis of education had been on scientific and technological knowledge, at the expense of a firm grounding in "the transmission of ideas of value" (Schumacher, 1973, p. 86). He stressed the importance of an ethical and metaphysical grounding that would enable a view to the greater context in which the application of all knowledge would occur. "It is only when we can see the world as a ladder, and when we can see man's position on the ladder, that we can recognize a meaningful task for man's life on earth" (Schumacher, 1973, p. 101).

This idea has been further developed by C. A. Bowers in his book, *The Culture of Denial*. He calls for nothing less that a complete paradigm shift in the philosophy of education that forms the bedrock of both public schooling and the university system. He contends that, to date, with but a few exceptions, most environmental education courses have been merely window dressing, or add-ons, and have not really been fully indoctrinated into the core of the educational philosophy. Bowers feels that many educators are looking at environmental education from the perspective of the "modernist" philosophy that traces its roots back to the Scientific and Industrial Revolutions. This is based on an anthropocentric view of the world in which the individual is separate from his surroundings, and values

and needs are seen *exclusively* from his perspective. "The world is his oyster," so to speak. Change is progress that expands in a linear fashion. Social development is facilitated by economic and technological advances. Tradition is ultimately seen as a hindrance to this interpretation of progress. The setting for this drama is a secular world in which science becomes the source of information about the origins of life, experts the interpreters, and machines the analogs in understanding life processes (Bowers, 1997).

This "modernist" perspective remains the basis for a technological view of sustainability in which environmental problems can ultimately be solved through innovative technologies and policies (Orr, 1992). This results in what Bowers terms a double bind situation, similar to a negative feed-back loop. Academics fail to acknowledge that they themselves are products of the very situation they are attempting to change. Consequently, they fail to recognize the causal relationships between modern values and behavioral patterns, and the ecological crisis (Bowers, 1997). This results in a superficial analysis that addresses the symptoms rather than the causes.

Our growing knowledge of the physical laws that govern the universe, has rendered it increasingly difficult to reconcile the complete abnegation of the connections between education, culture and ecosystems perpetuated by the "modernist" view. By decontextualizing the individual, it exonerates his role in both causing and solving *our* environmental crisis.

Ecological Literacy

In contrast to the directions of modern society, this tradition emphasizes democratic participation, the extension of ethical obligations to the land community, careful ecological design, simplicity, widespread competence with natural systems, the sense of place, holism, decentralization of whatever can best be decentralized, and human-scaled technologies and communities. It is a tradition dedicated to the search for patterns, unity, connections between people of all ages, races, nationalities, and generations, and between people and the natural world (Orr, 1992, pp. 94-95).

In order to understand the vast number of connections that link our daily activities to the world around us, ecological literacy will become as essential to us as the skills of reading, writing and arithmetic. This has tremendous implications for what, and how we learn. It implies an expansion of each and every subject to include the environmental context of the information being studied. The green history of the world will no longer be the exception, but the rule. Economics will begin to consider the laws of thermodynamics, and the consequences of externalizing costs, as well as the true value of natural capital. Environmental management will go beyond mitigation, to prevention. Ironically, one could say the same for medicine.

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The context of education must also be reconsidered. The limits imposed by the fragmentation of the educational system must be acknowledged, and transformed to accommodate the cross-fertilization allowed by an interdisciplinary approach. This has particular relevance for the study of the basic life support systems. Regenerative studies reveal the educational and ecological imperative of recognizing that the world around us is our most valuable classroom. The following chapter will discuss the Center for Regenerative Studies in more detail.

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CHAPTER 3: THE CENTER FOR REGENERATIVE STUDIES

The Center for Regenerative Studies (CRS) is an interdisciplinary, educational facility devoted to the study of basic life support systems. The regenerative strategies discussed in the preceding chapter provide the framework for these endeavors. As mentioned in the introductory chapter, this project is a single case study of CRS, and an attempt to better understand how to translate regenerative studies into regenerative actions. In this chapter, a brief history of the Center will be followed by an evaluation of the factors that contributed to the disparity that currently exists between the original intention of the Center and the reality. This will focus primarily on the relationship between a non-traditional center and a traditional university structure. A set of directives, or guidelines, that may be applied to subsequent attempts, and more specifically, the following chapter regarding Central Carolina Community College, will be examined at the end of this chapter.

EVOLUTION OF CRS

CRS is located on the campus of California State Polytechnic Institute, (Cal Poly), in Pomona, California. The 16 acre site is devoted to the education, demonstration, and research of regenerative systems. These systems provide, to varying degrees, for the basic needs of its community of 20 residents, in the areas of shelter, energy, food production, and waste and water treatment. Residents of the community spend an average of two years participating in interdisciplinary courses and labs that focus on the technical and hands on, as well as the philosophical aspects of regenerative systems.

The original mission of the Center focused on three areas:

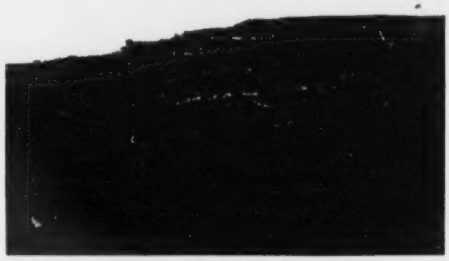
- regenerative processes and the ecological systems and behavior upon which they are based,
- interdisciplinary lectures and labs focusing on application of this knowledge to the local living environment, through the philosophy of learning by doing,
- interaction of the community and the regenerative systems upon which they rely. (Lyle, graduation speech, 1997)

HISTORY

The development of the Center for Regenerative Studies emerged from the intersection of two very different streams of thought. One originated in 1976, in a graduate landscape architecture studio. Students were challenged to design a student community on the campus of Cal Poly, Pomona, that would provide sustainable forms of life support for its members. This studio was taught by John Lyle and Jeffrey Olsen. John Lyle continued to pursue this idea in subsequent studios, as well as through his own research (Lyle, graduation speech, 1997).

The second stream had begun in 1957, with the creation of an active class III sanitary landfill, adjacent to the campus of Cal Poly, Pomona. *

This was intended to meet the garbage disposal needs of the Pomona and San Gabriel valleys. When the landfill opened, the college gave it 45 acres of land in exchange for free garbage disposal for the life of the landfill.



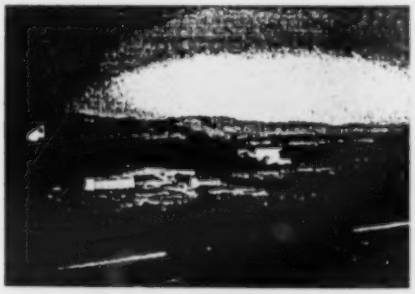
In the early 80's, in order to respond to the ever expanding needs of the increasing population of the local area, the County Sanitation Districts of L.A. County approached Cal Poly for additional land. An agreement was reached in October of 1985 between the two parties. Cal Poly gave an additional 75 acres of land to the landfill. In return, they were to receive annual funding for innovative educational and research projects exploring important environmental issues facing society. In addition, all of the lands originally donated by Cal Poly, plus another 100 acres would revert back to the university once the landfill was closed. A total of 339 acres was set aside for the landfill and a land resource laboratory known as LandLab. The Sanitation Districts also requested that a master plan be developed for the future use of the land. This was to be called the Spadra Landfill and Resource Conservation Project (Barnes, 1997).

The future CRS first began to take shape as a component of this master plan. Between 1985-87 an interdisciplinary group of ten faculty members, and two graduate students developed a conceptual design for what was then known as The Institute for Regenerative Studies. This was published in 1987 and later became known as The Gray Book I. Additional funding was obtained for the further articulation of both the theory and the physical site, and the construction of a large model. In 1988, the W.K. Kellogg Foundation, a long term supporter of the university, offered a challenge grant to support the development of a curriculum, with teaching as the central function of the Center. These and additional funds were used to begin the first phase of construction of the Center, which was to include two residential buildings, an office and laboratory building, a dining commons, a classroom and six aquaculture ponds. This included most of the infrastructure for the potential 90 students the Center was intended to accommodate, and housing for 20 residents (Lyle, 1996).

* The campus lands were donated by the W.K. Kellogg Foundation, in exchange for the maintenance of the Kellogg's large herd of Arabian horses. In 1957, the school was known as the S. California Branch of the California State Polytechnic College, San Luis Obispo. It was not until 1966 that the campus was officially separated from San Luis Obispo to become California's 16th state college.

Phase II included faculty offices and additional classroom and seminar space, and was completed in 1995. The final Phase III would ultimately complete the housing required for the full complement of residents and also include a library, as well as landscaping and a sewage treatment system.

SITE DESCRIPTION

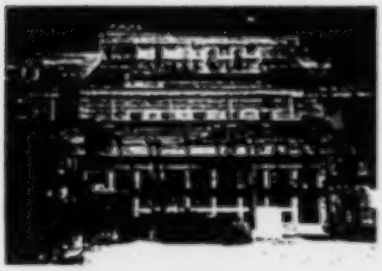


The Center is located to the south of the Cal Poly Campus, from which it is physically separated by Temple Avenue, a four-lane, heavily traveled road. The adjacent Spadra landfill serves as a constant reminder of both its origins and its longer range purpose. The 16 acre site is nestled in a narrow valley, running in an east-west direction, with low hills to the north and south. The land was once heavily grazed, which when compounded by the deleterious effects of drought, removed the majority of the native vegetation, with the exception of open stands of California walnut (*juglans californica*) (Safford, 1986). The climate is essentially Mediterranean, with the majority of the 14" of annual rainfall (on average) occurring during the winter months. Temperatures range between an average high of around 77 degrees Fahrenheit, and an average low of 47 degrees Fahrenheit. Winds remain below 8 miles per hour on average (Lyle, 1987).

The topography was the primary feature that determined the location of the various elements on the site. Since regenerative systems are intended to form symbiotic relationships with the local natural ecosystems, their success is directly predicated upon their location. They should also be informed by the disposition of the local landscape patterns.

Consequently, the water features were designated to go along the valley where natural drainage would occur.

and the buildings intended for the south facing slopes, to optimize solar gain.



Agricultural uses varied with the land forms, and included areas for integrating agriculture and aquaculture, as well as terraced slopes and contour plowing around the low hills (Lyle, 1987).

TIMELINE OF EVENTS

1957	Cal Poly gave 45 acres of land to establish landfill.
1976	Graduate L.A. studio, taught by J. Lyle and J. Olsen, asked to design a "sustainable" student community.
1983	Landfill's request for additional acreage from Cal Poly, in exchange for funds for R & D of environmental issues.
1985	EIR approved, funds given and Master Plan requested.
1987	Master Plan (Gray Book I) produced, including proposal for CRS, (then called the Institute for Regenerative Studies).
1987	Gray Book II produced, including more detailed description of the Institute.
1988	Challenge grant provided by W.K. Kellogg Foundation.
1991	Solar Park completed.
1992	October - Construction began Phase I.
1994	January 4, CRS opened to first cohort of 20 students.
1994	August - John Lyle, then director, left CRS.
1994	September - Diana Jerkins, new director, begins at CRS.
1994	October - CRS pulls out of the School of the Environment (ENV) and becomes an independent Center.
1995	Phase II completed
1997	October - CRS return to ENV.
1998	January - Diana Jerkins left CRS. No replacement designated.

CURRENT STATUS

A very thorough evaluation of certain functional aspects of CRS was conducted during the first six months of 1996. An interdisciplinary team of ten faculty members (3 of whom had served on the original design team), four students (either former or current residents of CRS), and the resident manager of the Center, reviewed the existing systems and assessed their levels of operation. After three years of operation, most of the systems were still found to be operating at a very basic level. * The team made recommendations for retrofitting where necessary, and completing those systems that had been omitted from Phases I and II, due to budgetary constraints. They also developed a plan for the construction of Phase III. This included additional buildings, and accommodation for the full 90 resident community.

In light of this existing documentation, and by virtue of the fact that one of the distinguishing characteristics of regenerative systems is their site specific nature, this study will take a much broader view. This will be concerned with identifying the overarching issues that both influenced and contributed to the present ambiguities overshadowing the current state of affairs.

*The original vision had foreseen four, incremental stages of development. The minimal level would be first. The second would reach stable operation, and then on to a third, fully integrated stage. Ultimately, the fourth stage would be one which would actually improve upon the existing technology.

EVALUATION

"In a way, the Center, from the beginning, we thought of as a microcosm, and we thought of it as a small version of the whole world in physical terms. . . . But what we didn't realize is that it's also a social microcosm, also a political microcosm, and in a way the difficulties the Center is having mirror the difficulties of these [regenerative] processes getting into the society as a whole. I think that it's important to keep trying, because if it's approached that way maybe we could learn something that would be useful in making the transition into the larger society." (John Lyle, interview, 1997)

In his book, *The Web of Life*, Fritjof Capra identifies what he considers the three key, interdependent criteria of living systems. He describes them in the following way. "The *pattern of organization* can be recognized only if it is embodied in a physical *structure* , and in living systems this embodiment is an ongoing *process* " (Capra, 1996, p. 160). These three properties, structure, pattern of organization and process, will be used as a framework to explore three different types of relationships at CRS. Each relationship is at a different scale. The first, and perhaps largest scale, is the structure of the relationship between CRS and Cal Poly. Next will be the pattern of organization within CRS, and how it was influenced by the former relationship. Finally, the ongoing process that *is* the CRS community will be considered, both from the perspective of an insider looking out, and an outsider looking in.

STRUCTURE - RELATIONSHIP BETWEEN CAL POLY AND CRS

A metaphor is a very powerful tool for transforming abstract concepts into more readily accessible ideas. Due to its power, however, it is imperative that consensus be established on the choice of metaphor. The relationship between Cal Poly and CRS can be used to illustrate this idea. Cal Poly's interpretation of the Center, seems to have been a building, where the university serves as the foundation upon which CRS depends. CRS, on the other hand appears to have envisioned a network of interrelationships, which is much more in keeping with the regenerative philosophy. The basis for many later conflicts begins to emerge. (The snowball is almost imperceptible when it begins its trek down the mountain.)

Inherent within any effort of collaboration is the issue of compromise. Many compromises occurred along the path that transformed the vision of the Center into a reality. It is important to assess the effects of these compromises in terms of the final product in order to ascertain their implications for other applications.

At first glance, an academic environment would seem a logical "fit" for an endeavor attempting to break new ground towards dissolving the institutional barriers placed around various disciplines. Furthermore, the philosophy professed by the California State System of "learning by doing," and supported by the technical expertise available to pursue this directive, would also conceivably advance this effort. However, the inertia embedded in the hierarchical, goal-driven structure of

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this educational system was overwhelmingly antithetical to the process-oriented nature of the vision proposed by the Center for Regenerative Studies.

Interests and Behaviors

One of the key issues that has emerged from this study is the question of the "fit" between a traditional university structure, and a non-traditional center, and the role that these differences may play in the development of a mutually sustaining relationship. It is vitally important that this relationship be based on shared trust and understanding. For this to happen, however, there must be areas of shared, or common, interests, combined with compatible behavior. Should interests not be shared, conflicts will emerge over time, and the worst case scenario, will result in a total lack of cooperation. On the other hand, incompatible behavior can also lead to the same false conflicts, or complete absence of cooperation (Bacon, 1984).

Throughout the development process of the Center for Regenerative Studies, there are many indications that the behaviors and interests of the university administration were motivated by their own understanding of appropriate administrative structuring, namely a hierarchical, top-down management structure, based on the industrial, or corporate model (Lyle, 1994). These were clearly incompatible with the process-oriented priorities held by those representing CRS.

Multiple Visions

"The length of our vision is our moral boundary" (Berry, 1977, p. 83).

A clearer understanding of the disparate visions for the Center is particularly important, for it is the original vision that will determine the parameters by which the ultimate success or failure is measured Objectives based on operational efficiency require a very different management strategy than social, or ecological objectives (Gunderson, 1995).

The financial climate of the California State University System has become increasingly tenuous in recent years due to significant funding cuts. This is perhaps an over-simplified attempt to explain the underlying financial expectations that the administration may have entertained with regards to the Center's revenue producing potential. This would not be entirely inconsistent with the traditional, goal-oriented model mentioned earlier. It would, however, seem totally incongruous with the broader process oriented nature of regenerative studies.

Rather than taking an exclusively economic approach to accounting, a regenerative system is more likely to be evaluated according to the life-cycle analysis approach discussed in reference to the regenerative strategies. This form of ecological accounting takes a much broader view, by considering a range of environmental impacts over the complete history of, in this case, the design of the Center (Vander Ryn, 1996).

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Substitutability vs. Complementarity

The Center received only part of the total funding originally sought for its construction. Many critical decisions were made regarding the allocation of these funds, which have had long term ramifications for its effective operation. Some of the systems were left unfinished, and perhaps, more importantly, housing was only provided for 20 residents, as opposed to 90. This has resulted in a small community, living in a large infrastructure, attempting to manage systems which are not even operational. Consequently, the maintenance requirements placed upon the residents were greatly underestimated. Not only do these students attend classes at the Center, and perform assigned maintenance tasks there, but they are also answerable to their individual degree programs, and the corresponding course requirements. This has left a rather broad gap between the possibilities and the realities. It is unlikely that the additional funds required for the completion of Phase III will be forthcoming, without some sense that those already spent have found fertile ground.

In a speech at the Bioneers Conference in San Francisco, Paul Hawken described this type of reasoning as the view of substitutability, where one thing may be replaced with another with impunity. He contrasted this with the more biological view of complementarity, in which the limiting factor is the one in shortest supply. This way of thinking doesn't allow for substitutes, but is based on the flow of services, with complementary relationships (Hawken, 1997).

It is this systemic way of thinking that best categorizes the original vision of Center for Regenerative Studies. As mentioned earlier, a bottom line, cost/benefit analysis way of thinking is entirely inappropriate for this situation. This is not to say that financial responsibility can be thrown to the wind. However, if key elements of a system are omitted, or substituted, the integrity of the system is destroyed, and it will never function as intended.

Interchangeable Parts

Substitutability can also lead to a misguided notion of interchangeable parts. This occurred at two very critical junctures along the path of the development of CRS. The first instance was subsequent to the receipt of the first grant moneys, when the university administration decided to reorganize the tasks and responsibilities for the development of the Center. Design and curriculum were relegated to two separate committees. Unfortunately, most of the original design team members were placed on the curriculum committee, and not able to participate at a significant level with the decisions of the design committee. Though this led to a broad infusion of new ideas, it was also detrimental to the continuity, and the strength of the original vision (Lyle, 1994, pp. 273-276).

A second disruption occurred seven months after the Center opened. The university administration elected to replace the Center's director. This decision was deleterious at many levels. It interrupted the momentum gained in these first

months of operation, and denied the director the opportunity to apply some of the lessons learned during this critical period. It also broke the bonds that the faculty teaching at the Center had developed through their many years of working together during the planning process that preceded the Center. A significant amount of trust in the administration's vision for the Center was also eroded. This created a very difficult environment for the newly appointed director, who one might say was given a virtually impossible task, tantamount to replacing the mercury in a broken thermometer. Unfortunately, rather than resurrecting the original vision, the new director overlaid yet another version on the existing structure, leading to further fragmentation and estrangement.

This is yet another structural incongruency that emerges from the comparison of a traditional management structure and an alternative one, and is exemplified by this notion of interchangeable parts that predominates in the former. This is highly destructive to the team-oriented nature of complementarity. The arbitrary replacement of team members undermines the incremental interdependencies and synergies that have developed over time, and erodes bonds of trust and understanding.

The next two portions of this chapter will deal more specifically with relationships within CRS. Therefore, the regenerative values discussed in chapter two, will re-emerge and be further developed within the context of CRS.

PATTERN OF ORGANIZATION - STRUCTURAL ISSUES AND CRS

The next relationship to be discussed will be the pattern of organization at CRS. It is tempting to see this as a direct response to the structural issues already mentioned, and this *will* be the focus of this evaluation. However, keeping in mind the systemic nature of the regenerative philosophy, it would be remiss to imply that a myriad of other factors were not also at play.

Scale

"Industrial technologies . . . are generally characterized by considerable economies of scale and therefore tend to grow continuously in organization as well as in physical size. Regenerative technologies . . . vary greatly in scale because they must be responsive to given biotic communities. In its implications for social organization, this is an important difference - perhaps the single most important difference between the two approaches" (Lyle, 1994, p. 264).

Issues of scale at CRS are as related to discussions of community, as they are to relations with Cal Poly. Here, however, the discussion will be restricted to ecological issues. The social aspects will be pursued later. In broad terms, questions of scale offer an excellent example of the interplay between the economic, environmental and social realms of sustainable development as represented by Cal Poly, CRS and the resident community at CRS, respectively. They also illustrate the tension that exists between the traditional establishment and many alternative efforts.

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The idea of a small, modular scale of operation was listed among the regenerative values, in the previous chapter. To quote E.F. Schumacher, author of *Small is Beautiful*, "there is wisdom in smallness if only on account of the smallness and patchiness of human knowledge, which relies on experiment far more than on understanding" (Schumacher, 1973, p. 37). Another key word in this idea is modular, which Lyle explains as "small, discrete units, and any number of units can be assembled to provide the needed capacity" (Lyle, 1994, p. 265).

When this idea is contrasted with the reality, keeping in mind the two previous interpretations, there is a distinct disparity between, not only the excessive infrastructure relative to housing capacity, but also the incompleteness of the few systems that *were* established. Consequently, any potential pattern of organization that could emerge from this irregular structure risks becoming more or less dysfunctional. Once again, the benefit of hindsight rests with the evaluator. At the time of construction it was anticipated that additional funding *would* be forthcoming to complete those systems left unfinished. However, it remains a good example of the distinction that can be made between industrial economies of scale. and the modular patterns of appropriate, regenerative scale.

Resilience

Though not specifically stated among the regenerative values, resilience is a trait commonly associated with systems of a small, modular scale of operation. Small scale, modular systems may be criticized for being inefficient, due to the higher levels of redundancy that they contain. However, this same redundancy allows for greater resilience when confronted with disturbances, both internal and external.

Over the course of transforming the CRS vision into a reality, increasing amounts of energy were focused on the structural aspects of "getting it built." This, consequently, resulted in a lack of resilience by forcing other aspects of the project to conform to this priority. The "democracy" of systemic behavior is predicated upon a web of interrelationships, and a continual cycle of both positive and negative feedback loops. When one system becomes emphasized without regard for the ramifications of this for the other systems that interact with it, increasingly chaotic behavior can result. This may ultimately degenerate into a collapse of the system. This will be discussed further at the conclusion of this chapter. What follows is a closer look at the CRS community.

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PROCESS - COMMUNITY

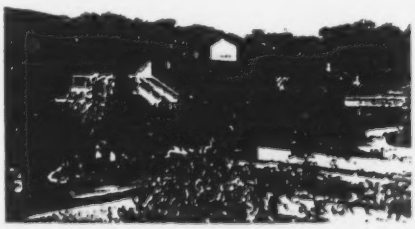
"It is obvious, indeed, that no change of system or machinery can avert those causes of social *malaise* which consist in the egotism, greed, or quarrelsomeness of human nature. What it can do is to create an environment in which those are not the qualities which are encouraged. It cannot secure that men live up to their principles. What it can do is to establish their social order upon principles to which, it they please, they can live up and not live down. It cannot control their actions. It can offer them an end on which to fix their minds and, as their minds are, so in the long run and with exceptions, their practical activity will be."

R.H. Tawney quoted by E.F. Schumacher in *Small is Beautiful*, 1973, p. 279.

From its inception, the Center for Regenerative Studies was intended to be an independent community, whose needs were provided both for and by the community, thus demonstrating the interactions of humans and regenerative systems. The operation of these systems generally requires increased levels of work and cooperation, when compared to industrial practices, therefore, exploration of these processes would offer important indications about the impacts of this transition. It was estimated that a community of approximately 90 residents would be sufficient to fulfill the required tasks, and still retain a sense of connectedness amongst themselves (Lyle, 1987). Many of the working assumptions upon which this original theory was based were ultimately undermined by both insufficient information, and funding. A closer examination of the community will be made from an insider's perspective, followed by that of an outsiders'.

Inside looking out

The human system had the potential to become the critical link responsible for embodying a regenerative pattern of organization for the various systems into the physical structures themselves. For all intents and purposes this has yet to happen. As mentioned earlier, the decision to invest the limited amount of funds into infrastructure rather than a small scale, modular version with the full complement of systems was probably a wise long term investment, but this has also had some serious consequences for the short term.



Once the Center opened, it became apparent that a lot of questions about policy remained unanswered. Systems of governance within the community, as well as the community's relationship to the faculty and administrators of the Center were among the more prominent areas that lacked adequate clarification. This situation has been exacerbated by the lack of continuity of both faculty and administration, as well as by the physical and philosophical distances that separate the Center from the larger campus of Cal Poly.

Outside looking in

As is often the case, CRS is better known outside the bounds of its own community than within them. It was surprising to discover that not only was there not a waiting list for admission, but that they had encountered difficulties filling the 20 available positions. One may ask where the founders believed students would come from, particularly in light of Cal Poly's largely commuter-oriented student body. This is also complicated by the required two-year commitment for residents, which is difficult for the majority of students at Cal Poly who have outside jobs, to consider.

It is possible to take courses at the Center as a non-resident. In fact this has been strongly encouraged. It offers a means to further disperse the work load of running the systems. It provides opportunities for an exchange of ideas between the residents and non-residents, as well as an opportunity for recruitment. Perhaps most importantly, it swells the numbers of the community to a much healthier level, and dilutes the tendency towards cliques that a smaller community can promote.

Unfortunately, non-resident participation has declined. A number of reasons can be offered to explain this. Heretofore most of the responsibility for recruitment has rested on the shoulders of the residents, and the varying degrees of energy each group is willing to devote to it. Second, unfavorable relationships between CRS and many of the departments on campus due to both past and present situations have not facilitated an open exchange of students. One of the common perceptions on campus of CRS is "the hippies on the hill." Third, scheduling has often been cited as a problem. It is difficult, not only to coordinate CRS schedules with the rest of campus, but also to accommodate travel time to CRS. Options include: walking - approximately 15 minutes; a shuttle bus runs between various spots on campus and CRS every 20 minutes; biking is not for the faint of heart due to the long, steep drive up to the Center; driving is discouraged, but allowed, however, the parking is very limited. Logistical questions have been partially resolved by teaching the entry level courses on campus, but the same difficulties remain for upper level, more advanced courses. Attempts are being made to build bridges with the campus by forging partnerships with other departments and crosslisting courses. There is also interest in creating a part-time public relations position to aid this effort.

Outside of the campus of Cal Poly, CRS has received a tremendous amount of publicity since it opened. Thousands of visitors have toured the facility, and many, many more have read about it in both environmental publications and the wider press, or have even seen it on television. CRS is currently looking towards this broader audience as well for future enrollments.

Thus far, some of the existing gaps between traditional and alternative management structures have merely been identified. It is now time to be more explicit about ways to bridge these gaps. This will begin with a discussion of adaptive management.

ADAPTIVE MANAGEMENT

"Adaptive management is an inductive approach, relying on comparative studies that blend ecological theories with observation and with the design of planned interventions in nature and with an understanding of human response processes" (Gunderson, 1995, p. 491).

It focuses on the interactions between ecological systems and social ones, more specifically, institutions that attempt to manage ecosystems. Adaptive management is built on the premise that systems are unpredictable, therefore, a certain amount of evolution and coevolution must be expected, and policies must be flexible enough to accommodate these changes (Gunderson, 1995).

In the final portion of this evaluation section I shall be drawing heavily on the book, *Barriers and Bridges to the Renewal of Ecosystems and Institutions*, 1995. This is a compilation of case studies of ecosystem management at varying scales, used to illustrate certain guidelines for adaptive management. "It is this view of alternative phases in a cycle of birth, growth, death and renewal that seems to underlie any complex, adaptive system - ecological certainly, but human, institutional, and societal as well" (Holling, 1995, p. 25).

The authors have developed a four-phase model of ecosystem succession that also contains relevance for both economic and social systems. Phase one is *exploitation* by pioneers. As capital is accumulated and connections increase, a *conservative* or climax phase is achieved. This transition would be made by bureaucrats in a social system. Finally, however, resilience is decreased by the overconnectedness with the systems, and phase three, or *release*, begins. In social systems activists begin the dialogue and catalysts trigger the actual release. This is one of two opportunities for individuals, or small groups, to effect change within slower, larger systems. The second arises in phase four, the *reorganization* phase. At this point the system is weakly organized and regulated, and thus open to dynamic individuals with strategic ideas to either take the entire cycle to a new level of understanding, or to simply regroup, and begin anew. These processes are illustrated by the two tables that follow.

This model has been used as a framework to organize the results of this evaluation of CRS, and to identify both transitional phases where increased vigilance is recommended, as well as the types of individuals that may be helpful team members, that would guide CRS through these various transitions.

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Functions of Four Ecosystems and the Flow of Events Between Them (Holling, 1995, p. 22)

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Attributes of Groups Dominant at Different Phases of Adaptive Four Phase Cycle (Gunderson, 1995, p. 502)

	Phase of Adaptive Cycle				
Attribute	*r–K* 1–2	*K–Ω* 2–3	*Ω–a* 3–4	*a–r* 4–1	A–? 4–?
Group type	Bureaucracy	Activists	Catalysts	Decision makers strategist	Evolutionary
Activity focus	Self-serving	Insurgence	Unlearning	New learning cooperation	Deep transformation cooperation
Strategy	"Do as before but more"	"Weathering the storm"	"Unlearning yesterday"	"Inventing tomorrow"	
Response to changes	No change	Conflict	Shedding old behaviors	Reframing strategies	Invention
Time horizon	Time of office (linear time)	Present (discontinuous)	Time out (multiple scales)	Near future (multiple scales)	Distant future
Space horizon	Building and holding bounds	Destruction of old bounds	Suspension of bounds	Creating new bounds	
Nature of truth and reality	Constructed	Competing explanations	Discovering what works	Reconfiguring myths	New myths (visionary)

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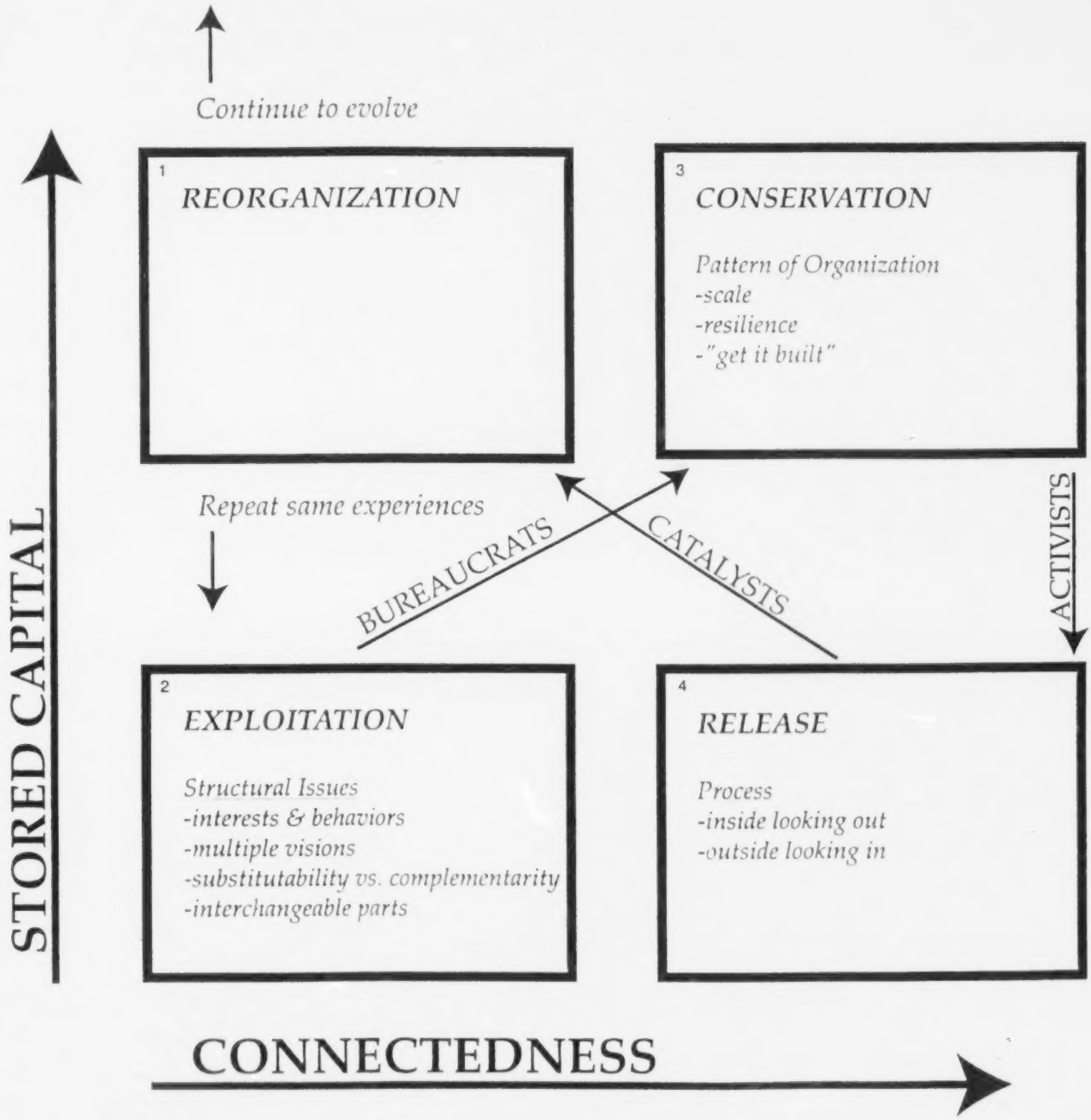
Four Phase Cycle Adapted for the Center for Regenerative Studies (CRS)



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The authors made a number of points regarding the structure of management teams, but two deserve special mention. They emphasized the significant roles played by individuals who initiate the phase transitions (bureaucrats for exploitation to conservation, activists for conservation to release, catalysts for release to reorganization, and strategists who begin the next cycle). The presence of all of these individuals is also important throughout the cycle, as a form of checks and balances, to insure resiliency and flexibility (Gunderson, 1995).

Another interesting point regards collaboration. Three types are described: planning-led, vision-led, and learning-led, of which vision-led is most relevant here. Vision-led collaboration is effective at defining the issues and mobilizing action. Resources are generally based on individual commitments rather than the more conventional channels, and can lead to burn out. The weakest link, however, is the structuring and institutionalization of tasks (Westley, 1995). "Key to the continuity over time of vision-led collaboration is the development of a stable team, capable of turning visions into structures" (Westley, 1995, p. 413).

The final portion of this section will propose an initial attempt at a list of derived guidelines that were taken from *Barriers and Bridges*, and could potentially be adapted for situations at both CRS and CCCC.

DERIVED GUIDELINES

"The essential point is that evolving systems require policies and actions that not only satisfy social objectives but also achieve continually modified understanding of the evolving conditions and provide flexibility for adapting to surprises" (Holling, 1995, p. 14).

The list of postulates, quoted below, emerged as guidelines for efforts to build bridges between resource management and institutions:

- integrated policies, not piecemeal ones,
- flexible, adaptive policies, not rigid, locked-in ones,
- management and planning for learning, not simply for economic or social product,
- monitoring designed as a part of active interventions to achieve understanding and to identify remedial response, not monitoring for monitoring's sake,
- investments in eclectic science, not just in controlled science,
- citizen involvement and partnership to build "civic science" (Lee 1993), not public information programs to inform passively.

(Holling, 1995, p. 9)

As with the regenerative values, this is but the beginning of a list of guidelines that may be used to initiate the collaborative process, and start to translate values into policies. Once again, what distinguishes this approach is the emphasis on integrating flexibility and learning. These are essential considerations if one indeed agrees that "sustainability is a journey, not a destination."

Thus far, an attempt has been made to convey the important role that regenerative thinking can play in guiding humanity along a sustainable journey. It is equally important to identify areas where this thinking can be translated into effective activity. If sustainability is to become an integral part of daily life as we know it, its reach must be extended to include the broadest possible range of individuals and experiences. It would behoove proponents of sustainability to begin to focus on the many, rather than the few. This does imply certain tradeoffs between the breadth and the depth of understanding that can be achieved. However, the essential thing is to create a shift in the thinking that is driving our current system on its unsustainable journey.

The next chapter will focus on the community college system. It will include an attempt to explain both why, and how this system can play a primary role in promoting the shift in consciousness that will be required in order to transform sustainability into a way of life.

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CHAPTER 4: CENTRAL CAROLINA COMMUNITY COLLEGE, PITTSBORO, NC

This chapter is an attempt to pull together many of the ideas presented thus far, and envision how they could be applied within the context of the community college system, and more specifically, on the Pittsboro campus of the Central Carolina Community College (CCCC). The community college system was chosen as an area of focus, because it offers the opportunity to extend the reach of regenerative thinking beyond the few, to the many. The community college system also shares many of the basic concepts of the regenerative value system discussed in chapter two. A brief history of the national community college system, will be followed by a closer look at how this system has developed within the state of North Carolina. The next portion of this chapter will describe the Sustainable Farming Program that has been developed on the Pittsboro campus of CCCC. Recommendations for the potential "regenerative" development of this program will conclude this chapter.

HISTORY OF THE COMMUNITY COLLEGE SYSTEM

"The modern community junior college is based upon the premise that the masses are entitled to collegiate training. It is perhaps the most democratically orientated and uniquely American institution in our system of higher education" (Segner, 1974, Preface, p. ii).

The community college system is a relatively recent arrival to the world of education, whose modest beginnings, less than 100 years ago, belie the significant role it has come to play within that world. By the 1980's, community colleges could be found in every state, and were already enrolling half of America's beginning college students (Cohen, 1982). There are now 1500 community colleges, with total enrollments of approximately ten million students. In North Carolina, one out of every six adults enrolls in a community college. This translated to a total enrollment of 779,000 in 1996 (Bellans, 1998).

The following history explores the range of impulses that fostered both its development and its ultimate success at extending the reach of higher education.

UNITED STATES COMMUNITY COLLEGE SYSTEM

"It may be best to categorize community colleges merely as untraditional. They do not follow the tradition of higher education as it developed from the colonial colleges through the universities. . . . Never satisfied with resting on what been done before, they try new approaches to old problems. They maintain open channels for individuals, enhancing the social mobility that has so characterized America. And they accept the idea that society can be better, just as individuals can better their lot within it" (Cohen, 1982, p. 28).

The concept of publicly supported education was rather slow to take hold in the United States. Universal education was mandated as early as 1647 by the Puritans, in the Massachusetts Bay Colony. However, it was not until the mid 1800's that legislation became widespread, and all northern states offered tax-supported elementary education. The southern and rural states were slower to shift the responsibility for education from the family to the school. Public high schools and universities (through the Morrill Acts of 1862 and 1890) followed the Civil War, and were accepted throughout the states by 1900 (Monroe, 1972).

There is some debate on which college may claim the distinction of being the very first public college, but it is generally agreed that this occurred in 1901, with the opening of the Joliet Junior College in Illinois (Boone, 1997). The term junior college relates to another force that influenced the development of higher education beyond high school. Proposals had been made as early as 1851 to establish junior colleges that would assume the responsibilities of the first and second years from the university. These were based on German models, in which attempts had been made to segregate the preparatory years from the more rigorous, advanced studies conducted at the university (Cohen, 1982).

This idea of publicly supported junior colleges met with considerable opposition in states with well established, church supported junior colleges, as will be discussed later, in the case of North Carolina. However, the western states embraced the idea, California in particular. In 1907, official legislation was passed in California, allowing the extension of high school, to include the first and second years of college courses. In 1917, the program was transformed into the establishment of locally supported, junior colleges. These were organized into districts, governed by local boards in 1921 (Boone, 1997). Many other states developed similar programs, and by the 1920's, it had become a national movement (Monroe, 1972).

A range of social factors has contributed to the growth and development of the community college system. Education has been identified as a key vehicle for breaking through the barriers of racial and social prejudice. It is also an essential foundation for an electorate capable of making decisions of national and international significance. There has also been an increasing demand to keep pace with the evolving needs of the workplace, through vocational and technical training (Cohen, 1982). This climate has also been challenged by the growing number of high school graduates. This was particularly relevant during the post World War II era, with the beneficiaries of the G. I. Bill of Rights (Boone, 1997).

Public recognition of most of these issues occurred in 1947, through a report made by the President's Commission on Higher Education, known as the Truman Commission Report. The report made a specific call for the development of a system of publicly supported, two year institutions, called community colleges, to promote democracy, through the education of the general populace. Though vocational and community specific instruction had been a component of the junior

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college philosophy since its inception, the commission's report placed specific emphasis on the colleges' responsibility to reflect the needs of their respective communities. This reinforced this symbiotic relationship, and set the stage for the growing importance that community education would assume in their development (Boone, 1997).

The essential characteristics of the community college reflect the mutually supportive relationships that have evolved between the college and its community. Low cost and open access discourage both racial and social discrimination. The community-based, comprehensive programs and support services are all tailored to meet local needs (Boone, 1997). The four primary curricular functions of the community college are:

- career (vocational - technical),
- compensatory (remedial) education,
- collegiate (academic transfer),
- community service and continuing education

(Cohen, 1982).

In terms of enrollments, the continuing education figures generally exceed those of the degree programs. However, the full-time equivalents (FTEs) are higher for the collegiate classes, because these students are usually taking more courses per term than the continuing education students, who may only take one workshop per term. This has significant implications for the various funding mechanisms set up to finance the different curricular functions. The collegiate and career courses usually receive more state funding, because of their income producing potential. The continuing education courses are primarily self-supporting, either through tuition, or through the help of outside agencies. The ultimate compensation for the realm of continuing education is the degree of flexibility they retain for course selection (Cohen, 1982). This area will be discussed further in the latter part of this chapter, but first, it is important to look at the history of North Carolina's system of community colleges.

NORTH CAROLINA COMMUNITY COLLEGE SYSTEM

General Statute 115D-1 provides:
"for the establishment, organization, and administration of a system of educational institutions throughout the state offering one or more of the general areas of two-year college parallel, technical, vocational, and adult education programs. . ."

The law further states that:
"the major purpose of each and every institution operating under the provisions of the Chapter shall be and shall continue to be the offering of vocational and technical education and training, and of basic, high school level, academic education needed in order to profit from vocational and technical education, for students who are high school graduates or who are

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beyond the compulsory age limit of the public school system and who have left the public schools"

Excerpt from the North Carolina State Board of Community Colleges Handbook, 1985

"The North Carolina Community College System is hailed as a national model," said Linda Bellans in the opening of a recent program on the future of the North Carolina Community College System (Bellans, 1998). North Carolina has been particularly successful at creating a unified system in which the central control has not jeopardized the individual college's ability to respond to its local community. This independence has enabled individual community colleges to respond quickly to the demands of their local communities, most commonly in the areas of job training.

This has been a relatively recent phenomenon, for North Carolina was among the slowest states to embrace the concept of community colleges. The first public junior college in North Carolina, the Buncombe County Junior College, opened in 1927, and remained the only public college until the late 1940's. This particular junior college triggered a debate that ended up in the State Supreme Court. The 1930, Supreme Court Case, Zimmerman vs. the Board of Education, supported the right of the school district to establish tax-supported education beyond high school. This case set a *national* precedent (Segner, 1974).

Debates about the need for a comprehensive community college system began in earnest in the early 1950's. These arose, in part, in response to the tremendous influx of enrollments during the post World War II era, as a consequence of the G. I. Bill of Rights. In order to accommodate this, North Carolina created off-campus university extension centers in 1946, but funding for these had ceased by 1949. Three of these centers ultimately became junior colleges, supported by local tax dollars and student tuitions, but it was becoming increasingly apparent that more facilities were needed. Another significant factor contributing to community college development was North Carolina's low national ranking of college enrollment. The state was ranked 47 out of the 48 states in 1950, with only 15.3% of the college age population actually enrolled in college, versus the national average of 28.4% (Segner, 1974).

A discussion of influences would not be complete without recognizing the State Superintendent of Public Instruction, Clyde Erwin, who held this post from 1934 until his death in 1952. He was one of the first of many guardian angels who blessed the community college system in NC. His repeated efforts to focus the attention of the General Assembly on education beyond high school, ultimately resulted in the authorization of a commission to study and develop a plan for a state-wide network of community colleges. Unfortunately, when the Hurlburt Commission's final proposal was put before the General Assembly in 1953, it was defeated (Segner, 1974).

A variety of reasons have been suggested for this defeat, ranging from personal to political, from financial to philosophical. The death of Clyde Erwin in 1952, silenced one of the major supporters of the bill. The lack of political support from Governor William Umstead also weakened the ranks of supporters. A mixture of factors incited opposition from proponents of the 22 existing private, church supported junior colleges. However, principal among these was the perceived threat to their existing enrollments. (This overlooked the fact that the majority of their students were from out-of-state.) From a strictly financial perspective, opponents were fearful that the existing financial requirements of the public school system could ill afford a further extension of funds (Segner, 1974). Perhaps the overarching reason given was that "there was a void in the quality of leadership that is usually needed in order to obtain acceptance of such a controversial and revolutionary concept" (Segner, 1974, p. 57).

Therefore, in 1953, instead of sanctioning a great leap forward the General Assembly approved the first of many small steps. The Governor was authorized to appoint a Commission on Higher Education to study the state of higher education in North Carolina, and make recommendations to the legislature of 1955. Four years later, in 1957, the Community College Act passed the General Assembly. The form of community college sanctioned by this act deviated significantly from the national model described by the Truman Commission Report in 1947. Many of the commitments to open access were replaced with tighter measures, such as higher fees, entrance exams, and small districts of one county only. Funding was restricted to academic courses, with no allocations for vocational training or adult education. This reduced the autonomy of the colleges, as did the replacement of the local school boards with a local board of twelve trustees that would report to the State Board of Higher Education, and receive directions from them (Segner, 1974).

The year 1957, also bore witness to legislation authorizing the creation of publicly supported Industrial Education Centers (IECs). These centers were created "to train a labor force in order to attract more industry to the State," or so Governor Luther Hodges believed (Segner, 1974, p. 61). The IECs were largely a reaction to the failure of the Community College Bill of 1953. They began as strictly vocational education centers, that had the potential to ultimately become comprehensive community colleges. They were extremely successful. North Carolina was the first state to be designated by the Department of Defense for advanced training of technicians. This was accompanied by a loan of one million dollars in machine tools (Segner, 1974).

Dallas Herring, chairman and long serving board member of the Board of Education, as well as the Board of Higher Education, is another guardian angel that many, including Governor Terry Sanford, another guardian angel of education, credit as the motivating force behind both the IECs and the community college movement. His repeated requests to review North Carolina's system of higher education found fertile ground with the newly elected, Governor Sanford. (Quality education had been the focus of the new governor's election campaign.) In 1961,

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Governor Sanford appointed the Governor's Commission on Education Beyond High School, otherwise known as the Carlyle Commission (Segner, 1974).

This commission drew heavily from two earlier studies. Concepts contained in the failed 1953 Community College Bill, based on the Hurlburt Commission report, provided a philosophical foundation. A more recent report, published by Dr. Horace Hamilton in 1962, outlining the extent of the crisis in higher education throughout the state, provided many of the supporting arguments required to carry the legislation through the General Assembly. One of the more salient of these was the estimated $1.5 million of capital outlays that could be saved by substituting dormitory expansion on existing campuses with a more comprehensive community college system. Students would also be saved personal outlays for room and board away from home. The commission also recognized additional savings that could be achieved by merging the existing IEC system with the community college system.

In 1963, the General Assembly transformed the Carlyle Commission Report into law, and a Department of Community Colleges was established under the authority of the State Board of Education. This brought North Carolina much closer to the national model, outlined by the Truman Commission Report of 1947. Revisions occurred in 1979, when the State Board of Community Colleges was created by the General Assembly to direct the Department of Community Colleges (Dowdy, 1985).

The 1963 legislation placed the 20 IEC's and the six community colleges together, under the Department of Community Colleges (Dowdy, 1985). This early partnership of vocational and educational components has been instrumental in the current success of the North Carolina System. In order to best serve local needs, the colleges have maintained a high degree of independence and flexibility, resulting in a relatively decentralized system (Bellans, 1998). Though this has been primarily to serve local businesses and industry, it is equally beneficial for a broad range of community needs. The next part of this chapter will focus on the Central Carolina Community College in Pittsboro, NC, and attempts it has made to meet local needs through a Sustainable Farming Program.

EVOLUTION OF CENTRAL CAROLINA COMMUNITY COLLEGE'S SUSTAINABLE FARMING PROGRAM

In September of 1992, the Pittsboro campus became the fourth campus of the Central Carolina Community College (CCCC) System. The CCCC System began in 1958, when an industrial education center (IEC) was approved for Sanford, in Lee County. It remains the primary campus for the system. Other campuses are located in Harnett County, between Lillington and Buies

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Creek, and in Siler City, in Chatham County. Siler City was the site of the first community college in Chatham County. Various temporary locations were used there until more permanent quarters were established in 1984. The Siler City campus is now focused almost exclusively on continuing education, and the Pittsboro campus has assumed responsibility for the curricular functions for the county.

HISTORY OF THE SUSTAINABLE FARMING PROGRAM (SFP)

The Sustainable Farming Program is, in essence, a collaborative effort to meet the needs of the greater Pittsboro and Chatham County communities. Agriculture and related businesses provide around 60% of the county's revenue, about 85% of which comes from the poultry industry. The farm population, however, declined by 64% between 1970 and 1990, from 4,370 to 1,561, while the total population increased by nearly 10,000 (O'Farrell, 1996). This is a clear example of the national trend towards larger farms and fewer farmers. These structural changes are reflected in the landscape. Suburban sprawl is replacing the rural landscape, and small farmers are under mounting pressure to "get big, or get out."

As the externalized costs of sprawl become increasingly apparent in the forms of costly infrastructure, growing congestion and pollution, and loss of natural resources, rural communities, like Pittsboro, are looking for ways to protect their cultural heritage, and provide small farmers with opportunities to maintain profitability so they can stay on the land. The stated goal of the Sustainable Farming Program is "to prepare students in both entrepreneurial and technical skills necessary to develop and manage a profitable, environmentally sound, community-based small farm or agricultural business" (O'Farrell, 1996, p. 1).

The Sustainable Farming Program was a direct response to the community, by the community, through the community college. It grew out of the initiative of a local, organic farmer. In the fall of 1995, Harvey Harman, of Sustenance Farms, began teaching a market gardening course through the continuing education program at CCCC. The response was tremendous. So much so that plans were made to augment the offerings to include classes in animal husbandry and horticulture/landscape design. Other local farmers and professionals were recruited to help with the teaching responsibilities. Local non-profits, government agencies, and members of the university communities also came together in a collaborative effort to work with the community college to guide the development of the program. The complete Sustainable Farming Program began in January of 1997. Since the first course in 1995, the program has taught over 150 students.

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SITE DESCRIPTION

The Pittsboro campus of the Central Carolina Community College is located about one mile west of the Chatham County Courthouse, on Highway #64. The 40 acre site was formerly a dairy farm, and the main

buildings are still surrounded by gently undulating pasture. Future plans include the addition of three other buildings, and athletic facilities, but construction is contingent upon receiving the necessary funds from the county or the town of Pittsboro. (Traditionally, the state pays for the instructional costs, while buildings and maintenance are financed by the county and/or local budgets.)

Chatham County is part of the Piedmont Plateau, and Pittsboro lies above the Carolina slate belt. This parent material has produced the Georgeville silt loam which is the predominant soil type on this site. Slopes range from 2-6%, except for the southwestern border, where they increase to 6-10%. The soils are generally low in organic matter, and tend to be acidic, however, they do respond well to good management practices. They support a wide variety of grasses, hardwoods and conifers, but are incompatible with wetland plants due to their fine texture and clayey subsoil (Jurney, 1937).

The climate is continental, with an average of 192 frost free days. The first frost date is generally around October 24, and the last, averages around April 15. The mean rainfall is 44" and is relatively well distributed throughout the year. Snowfall averages 6", but does not linger. Hardy vegetables and winter cover crops will survive the relatively mild winters (Jurney, 1937).

CURRENT STATUS

"There is a need to create in the community a forum for its people and community agencies and organizations to collaborate in team efforts to confront and resolve those issues that are critical to the community and the well-being of its people."

Boone, 1997, p. 2

The Sustainable Farming Program is an excellent illustration of the power of collaboration. Collaboration continued to emerge as a prevalent theme throughout the series of interviews conducted during the research phase of this project. The other primary theme was community. In essence, the program is a collaborative effort to address the needs of the community.

The program is based in the Small Business Center to facilitate cross-pollination between it and other programs offered there that focus on entrepreneurial endeavors. One such program, the NC Rural Entrepreneurship through Action Learning, (R.E.A.L.), program, provides its students with opportunities to learn and apply business skills to their own small business endeavors. Start-up capital is

available from the NC R.E.A.L. Revolving Loan Fund for those participants who complete the course requirements. This greatly complements the efforts of the Sustainable Farming Program.

Local expertise satisfies the bulk of the teaching responsibilities for the Sustainable Farming Program. Outside professionals are brought in for more specialized workshops throughout the course of the year.

The community college has also allocated a five acre site to the program that is used for demonstrations and hands-on instruction. This area, called Land Lab, is located on the southwest corner of the campus.

The program has fostered a broad collaboration between a number of different groups that have agreed to serve as a board of directors for the program. This board includes representatives from CCCC, NC Cooperative Extension, Carolina Farm Stewardship Association, American Livestock Breeds Conservancy, NC A&T University, and NC State University, as well as a number of local farmers and community members.

Together they offer guidance and support to the program by attending quarterly meetings, and serving on more focused committees. The program is administered by a coordinator who divides his ten hours per week (paid by CCCC), between administrative responsibilities and work on the Land Lab. In addition to the support provided by the associated agencies and groups, volunteers from the local community have provided countless hours of work to keep the program going, and growing.

The management structure of the Sustainable Farming Program continues to evolve with the growth of the program. As part of the continuing education function of the college, it retains a great deal of flexibility and independence. In the early days of the program, the various committees were largely identical. As more people have joined, however, the original members have gradually made way for newer members to move into leadership positions. This has generated new ideas and prevented rendering certain individuals indispensable. Attempts were made to clarify the organizational structure of the program over the summer of 1998, following the resignation of four of the original members of the executive committee. Board members were encouraged to take a more active role in the various committees. The results of this process have been very positive.

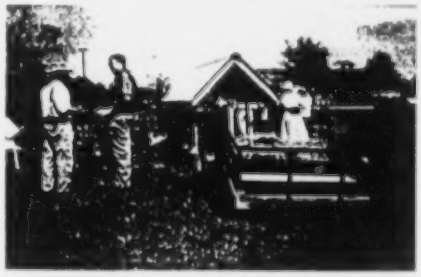
General consensus has been reached that the board of directors defines the direction and focus of the program, and implementation is the responsibility of the executive committee. This committee is composed of the chairs of the other committees, the

administrator, and a student representative (optional). The administrator then coordinates the efforts of the individual committees and the executive committee. (See graph on following page.)

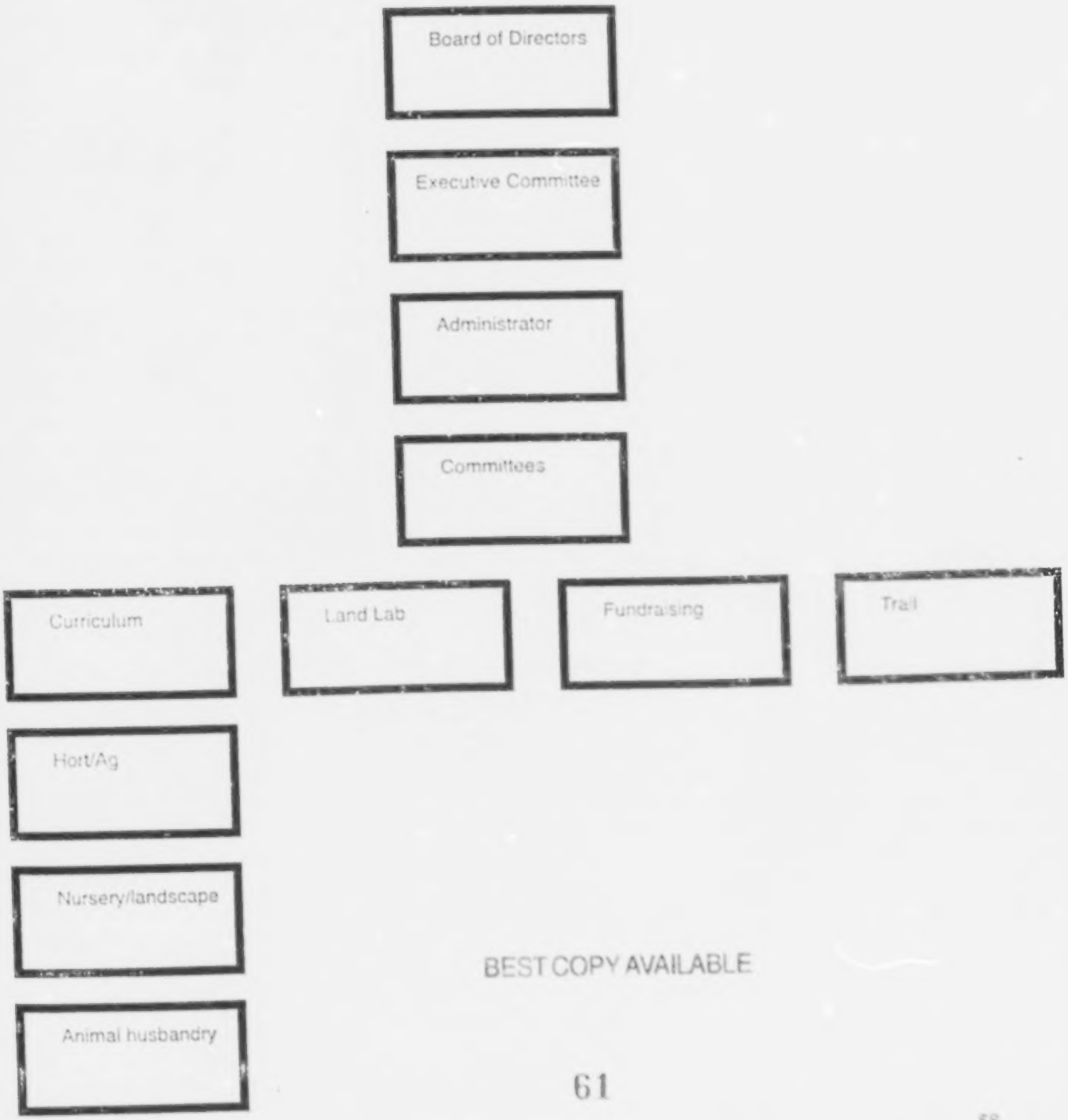
The current focus of the efforts of both the board of directors and the executive committee is to revisit the original mission statement and objectives of the program, first written during the summer of 1996. This is being driven by the need for the curriculum to respond to these goals. General agreement has been reached that the target audiences remain new and existing, mainstream and alternative growers. This certainly does not exclude other constituent groups, it only serves to provide a clearer direction for curriculum development.

The SFP curriculum is composed of a mixture of core courses and electives. After completing six core courses, four electives and a 300 hour internship, a student is awarded a Certificate in Farm Stewardship. Efforts are currently underway to restructure the curriculum along three different, but overlapping areas of focus: horticulture/agriculture, nursery/landscaping, and animal husbandry. A subcommittee would be created for each area from interested members of the board of directors. These subcommittees would assume the responsibility for developing courses and allocating instructors, a job currently conducted by the administrator and the curriculum committee. These subcommittees would also be asked to identify monthly workshops that would be seasonally appropriate for their area of focus. The final objective is to publish a yearly catalog of course offerings, to enable adequate time for publicity and planning. If successful, the courses have the potential to boost FTE generation, and the workshops could provide extra financial support for the program.

The Land Lab provides an excellent example of collaborative bridge building within the program. The development of the land lab site has brought together the community college and the Chatham County Center of the NC Cooperative Extension Service. This is particularly significant because there are often competitive barriers that stand between these two groups. In this case, however, the college has given land to be used as a demonstration and research site, so that farmers and other members of the community can see a variety of sustainable agricultural practices, during field days and other special events held there. It is also a valuable resource for the SFP to use as an outdoor classroom for hands-on instruction. Some of the many course activities that occur on the land lab site include vegetable, flower, and herb production, fencing and cover crop demonstrations, composting, and most currently, a building project. The agriculture and home building classes are working together on a passive solar storage shed, which will provide much needed utility space for tools and machinery used on site.



SFP Organizational Structure



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The trail project is yet another example of an existing cooperative arrangement. This project is shared by the SFP, CCCC, the Council on Aging, and the Pittsboro Rotary Club. It began when funds were received for a grant proposal to build the "Linking the Generations for Health and Fitness Trail." This trail is intended to connect the Council on Aging, located to the northwest of the campus, to the day care center at the community college. The Council on Aging provides support services for the older adults in the community, and considers a walking trail to be a very beneficial addition to its current programs. The SFP is both designing and constructing the trail through its Landscape Design and Installation course. Additional funds are being sought to fund another trail that will circumnavigate the campus, going through the land lab site, and also providing a link to the Boy Scout Lodge to the southwest of the campus.

RECOMMENDATIONS

When initial work began with the SFP, the original intention was to provide ideas about how they could expand the land lab site to include other systems such as those studied at CRS. There is convincing evidence that the community college system is a very appropriate venue for disseminating both the knowledge and the application of regenerative systems. Not only does this system contain great flexibility within the category of continuing education, but it also was specifically charged to respond to the needs of the local community. To meet the challenges of sustainability will require a tremendous effort in the realm of education, as discussed earlier. A decentralized system that reflects the individual needs of a very diverse range of environmental conditions seems a productive place to begin this journey.

As work continued with the SFP, it became increasingly evident that the project was attempting to address questions of how they could expand their program, without first addressing fundamental questions of what their program was really intended to achieve. In other words, questions of how were taking precedence over the what questions. To repeat, questions of what? and why? are policy questions, where? and why? are planning questions, and how? and why? are design questions.

The consequent recommendations will focus on the process of clarifying this what question, by employing the same framework used for CRS to explain these ideas, namely, structure, pattern of organization, and process. As before, the *pattern of organization* is continually embodied in the *structure* through an ongoing *process*.

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Structure

To clarify the mission of the SFP will demand a continued collaborative effort that is constantly evolving. One of the primary considerations for successful collaboration is representation of all stakeholders. Though the SFP is to be applauded for the diversity of their board of directors, significant absences remain. Primary among these would be the presence of local town and county government officials.

When discussing collaboration at CRS, it was described as vision-led collaboration, with strong issue definition and action mobilization, but weak resource mobilization and institutionalization (see chart). Collaboration at the SFP could be described as primarily learning-led, which generally springs from individuals coming together, or community groups. The strengths and weaknesses of learning-led collaboration mirror those of vision-led, but for different reasons. Where the most significant weakness of vision-led was institutionalization, that of learning-led is resources. Issues can become diluted by the need to "piggy-back" with other organizations to access funding. It is the lack of funds that result in the poor structuring (Westley, 1995).

Another form of collaboration exists which is planning-led. These are most often a result of governmental mandates. In contrast to the two former types, this one is typically weakest in the area of issue definition, which leads to further weakness in action mobilization. However, it is strong in areas of resources and structuring (Westley, 1995). By coordinating the efforts of the "planners" and the "learners," not only could the SFP become more comprehensive in its reach, but it could also demonstrate the practical benefits of its initiatives for the greater community. As local governments learn more about the externalized costs of sprawl, such as increased pollution and congestion, infrastructural costs for extending public services, loss of natural resources, and the transformation of rural communities into bedroom communities, they might begin to understand the real meaning of "doing well by doing good."

The local land trust, in this case the Triangle Land Conservancy (TLC), would be another important presence on the board of directors. The expertise regarding conservation easements and other strategies to aid land owners, and farmers in particular, confronted with escalating land values and inheritance issues, would be an additional opportunity to extend the reach of the group to the more traditional members of the community. A recent workshop, called "Agriculture as Economic Development," was held in Pittsboro in June of 1998, and was well attended by an extremely diverse group of community members. Many of the ideas discussed in the workshop focused on the purchase of development rights, which was described as a primary tool for preserving farmland. TLC could continue this dialogue in conjunction with other SFP efforts.

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Issue Definition, Mobilization of Actions and Resources by Mode of Organizational Change (Westley, 1995, p. 411)

	Issue Definition	Action Mobilization	Resource Mobilization	Structuring
Planning Mode	"Public arena" dynamics may force early closure of issue definition without sufficient data	"Public area" dynamics immobilze stakeholders, making coalition cooperation difficult	Resource channels secured often in advance of issue definition	Procedures/ normal task allocations often limited to preexisting structures
Learning Mode	Incremental issue definition through individual initiative or negotiations	Commitment in advance of issue definition	Need to "piggy-back" on other institutions to mobilize. Resources may be coopted in process	Lack of resources may make structuring difficult
Vision Mode	Visionary particularly skilled in issue definition process	Link between affect and action fully utilized	Creative resource mobilization	Overdependence on visionary leader. Failure to institutionalize process or assure resource flow

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Pattern of Organization

Principal among the issues with regard to the pattern of organization is the consolidation of the various structural components of the program. This would include the mission statement and goals, the curriculum, and the land lab projects. This is currently being addressed, but until that process is more clearly articulated, it would be difficult to envision advancing to the next level. These elements will provide the necessary foundation upon which to construct the vision. A remarkable amount of expertise already exists to develop any and all of the five systems present at CRS. However, without first determining who the audience is, why they are coming to the SFP, and what they want to take away with them, the program could easily fall into the same predicament as currently exists at CRS. The advantages held by the SFP are its relationships with the community college and the community.

Process

Once the foundation for the program is firmly established, it is then time to approach the community for both confirmation of established goals, additional ideas that may not have been addressed, and a commitment to support the program. There are many different ways to do this. Some examples will be discussed in the remaining portion of this section. Once again, the affiliation between the SFP and the community college offers an excellent opportunity to work directly with the community to create a new road map, to negotiate the challenges of a sustainable journey.

COLLABORATION AT THE COMMUNITY COLLEGE LEVEL

"The capacity to help communities visualize preferred futures is a unique contribution that design professionals can make to community planning and decision making. Charrettes provide for an airing of views, possibilities and visions that can frame the terms and catalyze community-wide commitment"

Watson, 1996, Precis.

A *charrette* is an intensive design exercise, or workshop, that challenges participants, often working together in teams, to produce solutions to a particular design problem within a compressed amount of time. Charrette is a French term, whose use may be traced back to 19th century Paris. Architecture students at the *Ecole des Beaux Arts* could often be seen desperately trying to complete their design projects, as they were being carried through the streets on the "cart," or *en charrette*, to their final examination or "design jury" as it is still called (Watson, 1996).

The charrette process is an excellent strategy for eliciting a maximum of ideas in a minimal amount of time. There are several reasons for this. One of the major

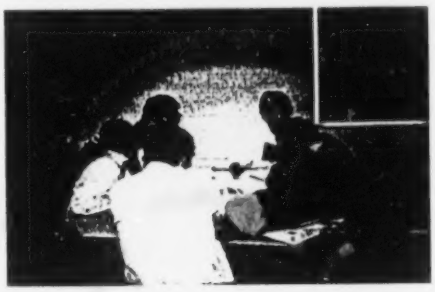
goals for any community design charrette is to include as many of the different stakeholders as possible. This not only provides access to a wide variety of information and ideas about the project, but also serves to initiate collaboration between these different parties. The relaxed, creative atmosphere of the charrette allows participants more freedom to explore a broad range of options for problem solving. This facilitates opportunities that may not be considered in more conventional planning efforts. Therefore, through the combined efforts of education, collaboration, and creation, magical things can happen.

The final portion of this chapter will discuss charrettes and other collaborative models intended to both advance and enlarge the dialogue between the community college, and the broader Pittsboro and Chatham County Communities.

CCCC/SFP CHARRETTE

On March 16, 1998, a design charrette was held in the Small Business Center on the Pittsboro campus of CCCC. There were three major goals for this charrette. It was intended to be a forum for as many of the stakeholders as possible to exchange ideas with one another, and to provide a wide range of feedback for the development of this project. The second goal was to acquaint the participants with both current and potential user groups and activities associated with the campus. The third goal was to introduce them to regenerative strategies and the five systems (shelter, food production, energy, water and waste treatment), being studied at CRS, and to begin to see the connections between the systems, and the user groups and activities on campus.

In attendance were members of the college administration, the provost of the Pittsboro and Siler City campuses, and the president of the CCCC System, instructors from the SFP, representatives from the partnering agencies, members of the board of directors, and students in the SFP program. After initial introductions and opening comments were made, the group generated lists of the current and potential user groups and activities at the community college. We then visited the land lab site together. Each participant was asked to focus on one of the five systems during the walk. Upon returning, they were asked to transfer their ideas to color coded post-it notes - one idea per note. Each color represented a different system. Next, the group was divided into smaller groups, composed of representatives of each of the five systems.



They were asked to combine all of their ideas into a single design, by placing their post-its together on a large base map. The different colors were very useful in highlighting the relationships between the various systems. Each group then presented its design to the entire group, and comments were made.

This illustration describes how the design charrette could be utilized by the SFP for projects at the community college. However, the same process could be a useful tool for coordinated efforts between the community college and the greater community. Other examples of collaborative efforts will be suggested at the conclusion of this chapter, but first, another collaborative process, called community-based programming will be discussed.

COMMUNITY-BASED PROGRAMMING

"Nevertheless, it is now time for community college leaders to evaluate their colleges' missions, to position their colleges to interact with broad-based issues in a structured way, and to join with other community leaders to identify, prioritize, and resolve issues that are having (or can have) an impact on the community's welfare."

Boone, 1997, p. 40

This is the essence of a process called community-based programming. It is founded on the principle that "programs designed to bring about a change in fundamental behaviors, or to address and resolve broad social issues, require a more flexible, conceptual approach based on systems thinking" (Boone, 1997, p. 4). (This is consistent with many of the derived guidelines for adaptive management, that are also based on systems thinking.) This process identifies the community college as the catalyst and facilitator for mobilizing a community to both identify, and resolve its most important issues. The process is composed of fifteen "processual tasks," based on collaborative efforts to determine a single topic of focus, interact with stakeholders, develop goals and plans of action, and evaluate results. The community college's role is to initiate this process by first identifying an issue, and the target public and stakeholders associated with this issue. After this, the community college moves into a support role, and a coalition of the target public members and the stakeholders continues the process through its stages of implementation and evaluation. Their involvement is critical for a successful result. The community college remains actively involved throughout the process, complementing the coalitions efforts with a range of supportive tasks (Boone, 1997).

The following portion of this chapter will suggest the implications of this process for Chatham County. It is important to remember that if one asks the community what they really need, one must be prepared to listen and respond.

Chatham County's "Road Map to the Future"

The needs of Chatham County were recently identified in a document written by the Strategic Plan Development Committee, entitled "Road Map to the Future." This document identified eleven major themes important to Chatham County, and included goals that related to each of the themes. The majority relate directly or indirectly to issues of sustainability and, more specifically, the same basic needs being studied at CRS. The eleven themes and are listed below, and illustrated by selected goals:

*THEME: **Balanced Growth**

GOALS: *Prime farmland conserved and protected to ensure agricultural lands remain in agriculture.*

Long term residential, institutional, commercial and industrial requirements for water supply, wastewater and solid waste management fulfilled at the lowest practicable cost.

*THEME: **Adequate & Diverse Housing Supply**

GOALS: *A wide variety of housing options (categories, densities, locations and prices) available in Chatham County.*

Land use planning emphasizes clustered, mixed use developments.

*THEME: **Conserved and Protected Natural Resources**

GOALS: *Chatham County's surface and underground water resources effectively protected.*

Soil erosion minimized and soil conservation maximized.

*THEME: **Efficient, Effective, and Responsible County and Municipal Governments**

GOALS: *Elected officials in county and municipal governments provide leadership which produces and implements proactive plans and policies.*

More effective citizen involvement, heightening public awareness and understanding of local government processes.

*THEME: **Healthy People**

GOALS: *A community environment which supports the practice of a healthy lifestyle.*

Organized recreational activities which promote citizen's health and community stability.

*THEME: **Safe Living and Working Environments**

GOAL: *Adequate water, wastewater and solid waste management services at the lowest, practicable cost.*

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***THEME: Quality System of Education**

GOAL: A system of schools, preschools, community colleges and libraries that are effectively managed to maintain or improve the quality of education.

***THEME: People Working Together**

GOAL: Community groups working with each other and governments across the county.

***THEME: Marketable, Diversified Workforce Relevant to Needs of the Community**

GOAL: Collaborative efforts between educational professionals, area schools, other educational institutions, business and industry to meet regional needs.

***THEME: Commercial & Industrial Endeavors, a net long-term asset to the Community**

GOAL: Agricultural enterprises in Chatham County are economically viable.

***THEME: Rich Cultural Environment**

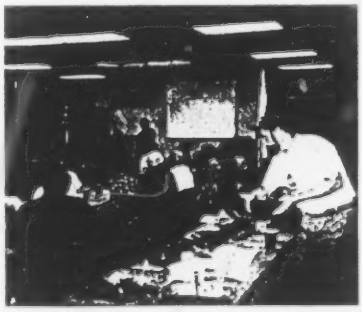
GOAL: Chatham's historic cultural heritage preserved, broadened and enriched.

COMMUNITY SUPPORTED ENVIRONMENT

In the concluding section of this chapter the same eleven themes cited above form the framework of a program that could be called Community Supported Environment, borrowing from the concept of Community Supported Agriculture. This program could be spearheaded by the SFP and gradually expanded, when appropriate, to encompass the entire community. The ways in which the SFP is already addressing many of the strategic plan themes will be identified first, followed by opportunities for ways in which they may be expanded.

THEME: Balanced Growth

- one of the best ways to conserve agricultural lands is to keep agriculture economically viable through environmentally sound practices, which is the goal of the SFP,
- education of the community about the importance of buying locally produced food was emphasized by the recent Farm City Week Celebration held in Pittsboro, and sponsored by the local farmers, during which the farmers fed the community during a special luncheon celebration

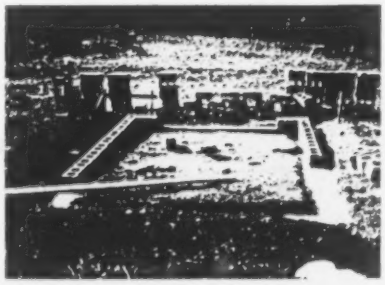


Opportunities:

- conservation easements and the establishment of agricultural districts is an excellent tool to ensure this over the long term, and can be facilitated through cooperation with the local land trust, The Triangle Land Conservancy.

THEME: Adequate & Diversified Housing Supply

- the "home building" class at SFP had 30 students in the fall of 1998, learning the principles of passive solar construction.



Opportunities:

- the home building class could begin to build low cost housing required by the town of Pittsboro, and include the future residents in the building process,
- maximizing open space possibilities protects natural resources,
- community gardens could begin at the community college to the northwest, beside the Council on Aging, or to the east, near W. Salisbury St.

THEME: Conserved & Protected Natural Areas

- the SFP is already addressing both of these goals by teaching sustainable farming techniques that emphasize building soil fertility without reliance on commercial fertilizers, diversified systems rather than factory farming, and cover crops to both prevent soil erosion and enrich the soil,

Opportunities:

- the SFP can guide the community in conducting an environmental inventory of the community as described in the book, *Where We Live*, by Donald Harker and Elizabeth Ungar Natter (see bibliography), so that people can begin to connect where they live with how they live.

THEME: Efficient, Effective, and Responsible county and municipal governments

- the collaborative methods suggested by community-based programming offer an excellent opportunity for this theme,

Opportunities:

- the interaction between local government officials with the SFP board of directors can highlight opportunities for each to better meet the needs of the community.
- "citizen involvement and partnerships to build 'civic science,' not public information programs to inform passively" (Gunderson, 1995, p. 9), and recognition of the public role already played by each and every individual as illustrated in the chart on the following page.

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THEME: **Healthy People**

- with its emphasis on sustainable farming practices that reduce the need for chemical pesticides, insecticides, and fungicides, the SFP is restoring not only the health of the land, but also the people who work it, and the people who depend upon it for the food and fiber that sustain life.
- the "Linking the Generations Trail" project, mentioned earlier, was designed specifically to meet this goal,

Opportunities:

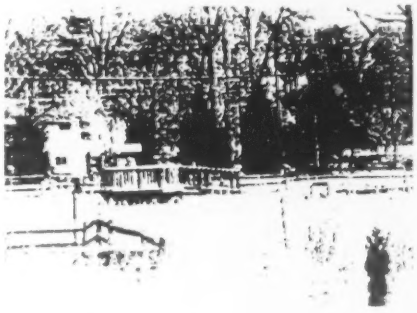
- potential exists to extend the trail into a greenway, or linear park, system that could not only connect the campus to the town of Pittsboro, via W. Salisbury St., but also include spurs to other neighborhoods along easements and natural areas.

THEME: **Safe Living and Work Environment**

- through the program at the SFP, students become more aware of the individual's responsibilities with regard to sustainable interaction with natural resources, through different conservation strategies,

Opportunities:

- water and waste treatment systems could be created at the community college to demonstrate strategies for residential conditions including graywater systems and constructed wetlands,
- one is never too young to learn the concept that waste equals food, as has been shown in many successful attempts to incorporate worm composting in public school systems,
- municipal composting is an effective job and revenue source, and a potential position for interns from the SFP.



THEME: **Quality System of Education**

- the SFP specifically meets the needs of continuing education for adults that want to learn how to live and work more sustainably.

Opportunities:

- the development of additional programs to meet the educational and service needs of the community are the driving factors of the community-based programming process.

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THEME: **People Working Together**

- the majority of initiatives conducted by the SFP revolve around people working together for a sustainable future,
- "More than any other public agency, more than any other educational institution, the community college has the opportunity, obligation, and resources to restore the problem of disconnectedness in our society. As we look into the future, it will not be business as usual. It *should be* Participation + Communication = Collaboration!" (Boone, 1997, p. 205)

Opportunities:

- from small towns along the eastern shore of Virginia to cities like Chattanooga, TN, citizens are working together to find sustainable solutions to their local environmental challenges (Bernard, 1997), and the same can happen in Pittsboro.

THEME: **Marketable, Diversified Workforce relevant to needs of the community**

- the mission of the SFP is directly related to this goal,

Opportunities:

- the potential exists for the SFP to develop a small business incubator to assist in developing small businesses associated with value-adding to the existing agricultural production.

THEME: **Commercial and Industrial Endeavors, a net long-term asset to the community**

- as mentioned earlier, the mission of the SFP clearly addresses this goal, as well as the role of the community in making it possible,
- the multiplier effect (the number of times money turns over in a local economy) of agriculture in Chatham County is 2, which means that agriculture adds $306,738,746.00 to the local economy (Groce, 1998).

THEME: **Rich Cultural Environment**

- "A culture is not a collection of relics or ornaments, but a practical necessity, and its corruption invokes calamity. A healthy culture is a communal order of memory, insight, value, work, conviviality, reverence, aspiration. It reveals the human necessities and the human limits. It clarifies our inescapable bonds to the earth and to each other. It assures that the necessary restraints are observed, that the necessary work is done, and that it is done well. A healthy farm culture can be based only upon familiarity and can grow only among a people soundly established upon the land; it nourishes and safeguards a human intelligence of the earth that no amount of technology can satisfactorily replace"

(Berry, 1977, p. 43).

CHAPTER 5: CONCLUSION

The breadth of this paper has placed certain restrictions on the depth of its conclusions. The overall intent has been to develop connections between what may initially appear to be disparate categories.

One of the underlying assumptions of this paper is that regenerative strategies would be useful tools in negotiating a sustainable journey. This was discussed in Chapter 2, and numerous examples, within the realms of policy, planning, and design were mentioned. However, perhaps the most fundamental reason for this is two-fold.

Regenerative systems are site specific. Different site conditions require different strategies. However, the relationship is a dialectical one, an evolutionary process through which each informs the other. Scale is also contingent upon the site conditions, because the carrying capacity of the site will dictate the size of any interaction with it. The unique requirements of each site are, consequently, better served by a decentralized organizational structure, that respects the ecological limits.

The second component is the community. Regenerative systems are more labor intensive, requiring more people to manage them. Therefore, the quantity of work is greater. What about the quality of work? I would contend that it too is greater than that entailed in conventional systems, due to the balance between the integration and the differentiation of the tasks involved in the management of these systems. "Good work is not just the maintenance of connections - as one is now said to work "for a living" or "to support a family" - but the *enactment* of connections" (Berry, 1977, p. 139). Regenerative systems are based on the enactment of connections, both within the individual systems, and as the systems interact with one another.

These same elements; small, modular scale, decentralization, community interactions, and participatory format, are also fundamental components of the community college system. Each college maintains a balance of integration with the overall system, yet is differentiated to reflect the concerns of its own community. Therefore, one may describe them as being of a small, modular scale in a decentralized system. Also present are the elements of community interaction, particularly with regard to continuing education and, more specifically, of participatory format with regard to community-based programming.

So what does all of this have to do with sustainability? It all goes back to pulling on the string, as mentioned in the context of recycled materials. Sustainability is contingent upon policy. Policy is enacted by people. People are made up of a myriad of communities. Communities are comprised of individuals - you and I. The only hope is for us, the individuals, to become aware of the interconnections between everyday decisions, and the world around us. The choice is ours, every day.

EPILOGUE

I first became interested in the Center for Regenerative Studies because it offered the increasingly rare opportunity to live more deliberately. Thoreau went to Walden, I went to Pomona. The environment has become such an abstract term that it is difficult to incorporate the tenets of sustainability into daily life. "Where there is no reliable accounting and therefore no competent knowledge of the economic and ecological effects of our lives, we cannot live lives that are economically and ecologically responsible. . . It is ultimately futile to plead and protest and lobby in favor of public ecological responsibility while, in virtually every act of our private lives, we endorse and support an economic system that is by intention, and perhaps by necessity, ecologically irresponsible" (Berry, 1999, p. 37)

Bringing together the different disciplines to focus their combined efforts on regenerative processes, is an inspiring concept. Creating a place where people can come together as a community to learn and implement a variety of regenerative strategies, in order to satisfy their basic needs, makes this manifest. "The spheres of life are many, and for each of them special sciences develop. But life itself is a whole, and the more the sciences strive to penetrate into the depths of the separate spheres, the more they withdraw themselves from seeing the world as a living unity. There must be a knowledge which seeks in the separate sciences the principle that leads man back to the fulness of life once more" (Steiner, 1963, p. 284). Though written in 1894, I feel that Rudolf Steiner's words capture the essence of the mission of the Center for Regenerative Studies.

I find it difficult to really conclude something that I see as but a meager beginning. What I can do is attempt to weave together some of the many threads mentioned in this paper, so as to consolidate the warp upon which the weft of my work can continue to create the fabric of my life.

As a result of experiences at CRS, I began to think about ways in which the reach of these regenerative strategies could be extended beyond the bounds of a single university. I have tried to convey the urgency for this by placing my discussion within the context of a green history of the world. If our civilization is to avoid repeating the errors of the past, it will require us to listen more carefully to the vital signs of the living systems upon which we depend. This process can begin with education. By placing an emphasis on ecological literacy, we can begin to attain the competency needed to make ecologically responsible decisions. Taking this to the next level could entail incorporating regenerative studies into the continuing education curriculum of the community college system. Each program would be individually designed to meet the specific needs of its community. These needs could be identified through the community-based programming process. This process would also facilitate the collaborative efforts needed to address these problems, by building a common data base.

The key to this or any other vision of a sustainable journey is the individual, you and I, and the decisions we make every day. I would like to conclude with a poem by Venie Holmgren, poet and "grandmother" of Permaculture.

All that I see out there is me
and all that is me I see
out there.

So, knowing, I cannot judge
nor condemn
nor rail at them
while holding I am pure,
an awkward situation, to be sure
but one with compensation
of knowing
that for all I see that saddens me
I balance with a beauty and a joy within
reflecting out there

(Holmgren, 1995, p. 27).

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